Scientific American.

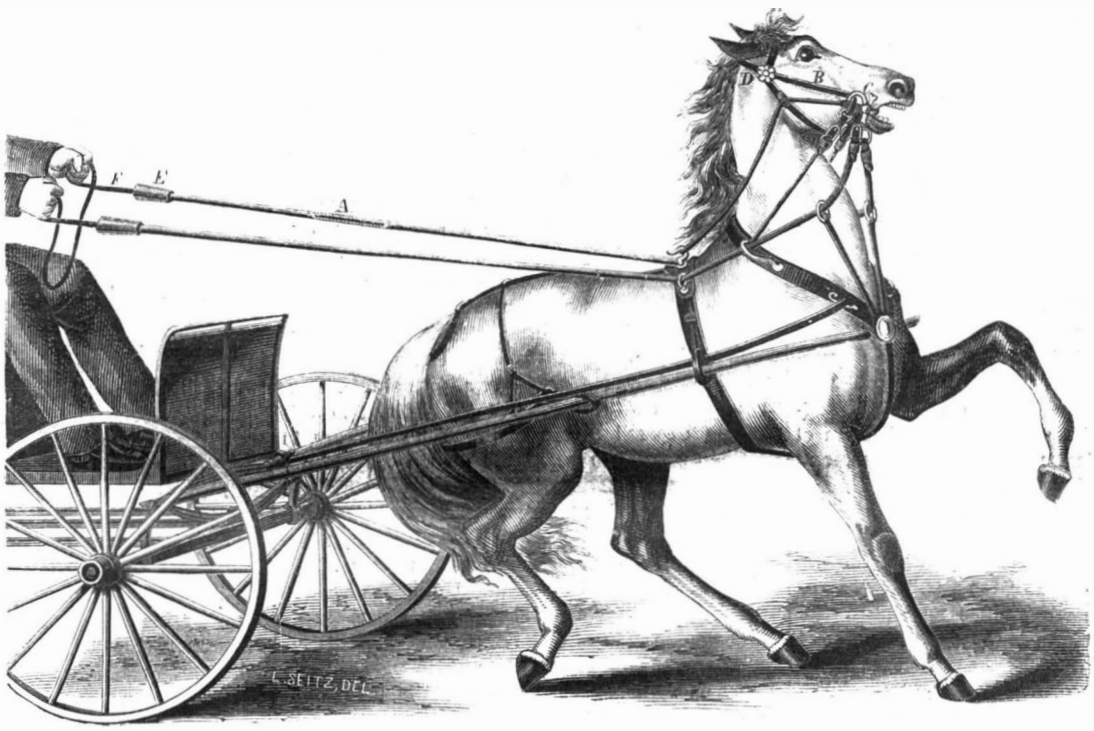
A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES.

Vol. XIV.---No. 5. (NEW SERIES.) NEW YORK, JANUARY 27, 1866. $3 PER ANNUM IN ADVANCE.

Improved Bridle.

As many accidents are continually occurring with spirited horses, from their taking fright and becoming uncontrollable, it is desirable that some efficient remedy be devised to prevent them.

In the engraving published in this connection, our artist has shown a very spirited animal foiled in the very act of running away, and thrown back almost on his haunches by the driver.



HARTMAN'S SAFETY BRIDLE.

The arrangement of the harness is quite simple. There is no change except in the reins and a part of the head stall. The reins are double, both being round, and one pair hollow, so that one passes through the other for a portion of the length. The details are as follows:—

The ordinary reins for driving are shown at A, with a part of the exterior cut out to show the inner lines. These latter are the ones by which the horse is instantly stopped. It will be seen that they are connected to a strap, B, which passes through the eye of a gag bit, C, and from thence to the head band, D, to which it is firmly fastened. Under ordinary circumstances the driver uses the lines, A, but when danger is imminent he merely allows the "hold fast," E, to slip through his hands and catches the smaller reins, F, as shown in the engraving, when the bit is thrown back into the jaw, and the horse has quite enough to do to take care of himself without running away. This arrangement gives perfect control over the most spirited or unruly beast, and would seem to be highly desirable.

It was patented Nov. 7, 1865, through the Scientific American Patent Agency, by S. B. Hartman, of Millersville, Pa.; for further information address him at that place.

ON A METHOD OF DRYING GLUTINOUS SUBSTANCES.

A large number of substances, like gum, etc., have, as is well known, the property of conglomerating, upon drying, into amorphous masses, more or less solid and translucent, by which, on the one hand, the original appearance of the freshly-made preparation is lost, and, on the other, complete desiccation rendered very difficult. In order to obviate this adhesion of the elementary particles occurring during the drying of such substances under ordinary circumstances, Reischauer has proposed to carry on this operation out of contact with the atmosphere, and by the aid of a suitable ethereal medium. The apparatus employed for this purpose is, in its simplest form, a well-closed glass vessel filled with ether or a similar liquid, at the bottom of which is placed the chloride of calcium, quicklime, calcined sulphate of copper, etc., intended to absorb the water. A shallow vessel is placed below the surface of the liquid for the reception of the substance to be dried. The *modus operandi* is now a very simple one. The ether continually yielding its water to the chloride of calcium, constantly withdraws it in turn from the substance to be dried, until, finally, the latter corresponds in its hygroscopic state with that of the desiccating agent. The thorough wetting in this manner, of the constituent particles of the substance to be dried, which of course must be those insoluble in an ethereal liquid, prevents their sticking together, and the original appearance is retained when dry.

Gum, separated by precipitating the aqueous solution with alcohol, gives an amorphous white mass of very slight adhesiveness, and with no trace of the common glass-like condition. The so-called diastase, or the body obtained by precipitating the extract of malt with alcohol, deprived of water under ether, forms spongy and very light granules. In this state it retains its effect upon starch. The microscopical examination of starch paste dried by this process leaves scarcely a doubt that the starch grains exist in paste in a state only of extraordinary expansion, and not in that of actual solution. Hops give a mass similar to diastase, but, however, no longer capable of producing fermentation.

The organs of plants dry rapidly under this treatment, commonly retaining their color, unless unusually delicate. Taken from the ether, they soon become moist again in the air, and rapidly lose their color, which by a continuance in the liquid, appears remarkably fine.

The behavior of animal productions under this method of drying is of especial interest. It may be remarked that, generally, while vegetable matters are distinguished by their great brittleness in the dry state, those of animal origin are characterized by a remarkable toughness, which reaches its highest degree in the fibrous formations of the skin. The pliability of thick skin dried in ether over chloride of calcium is very extraordinary. Other animal preparations at the same time preserve their original form in the dry state, the usual contraction of the parts being thus avoided. The whole intestines of a young dog, treated in this manner, formed a remarkable anatomical preparation, in which the delicate structures were preserved in the most complete manner upon drying. The lungs and liver, to preserve which vain attempts have hitherto been made, formed a light spongy mass, retaining completely their organization. It is more than probable that anatomists can make use of this process in many cases; as, for instance, in the microscopical examination of the kidneys, pancreas, etc., particularly in those which have hitherto required the solidification of the object by chromic acid, etc. The use of the ether in a liquid form is frequently not necessary. The skin of animals, animal membrane, etc., readily assume, in an atmosphere saturated with the vapor of ether, containing a suitable, strongly hygroscopic substance, a condition similar to that of white-dressed leather. A like satisfactory result, however, is not obtained in the desiccation of inorganic substances, oxide of iron, alumina, etc., in artificial media.

It is obvious that this process may be rendered useful, under suitable modifications, for other purposes. It is a ready method, according to Reischauer, for removing acid bodies soluble in ether from their aqueous solutions, by putting them into an ethereal liquid with caustic lime or potassa.—*Zeitz Anal. Chimie. from Dingl. Polyt. Journ.*

An Extensive Thread Manufactory.

The Clark Thread Company are erecting a new factory at Newark, N.J., comprising six buildings, the largest and most extensive in the country. Four millions of brick will be used. The main edifice is to be 323 feet long, 105 feet wide, and five stories high. The foundation of the main building is composed of solid concrete—a firm mass of stone and mortar. The walls are three feet thick at the base, falling off gradually in proportion to the hight of the building. Ample means against fire are provided. The cotton will be brought to the premises in the bale, and picked, blown, spun, dyed, bleached, wound and spooled, and thus made into thread. The spools will be made upon the premises, and the labels will be printed there. About 1,000 hands will be employed, 900 of whom will be females.

FULL one-half of the cheaper kind of finger rings, now manufactured in this country, are made under Jno. S. Palmer's patent, obtained through the Scientific American Patent Agency. So says the patentee.

PHYSICAL theory shows that a removal of the atmospheric pressure would raise the melting point of ice by 3-400th of a degree centigrade.

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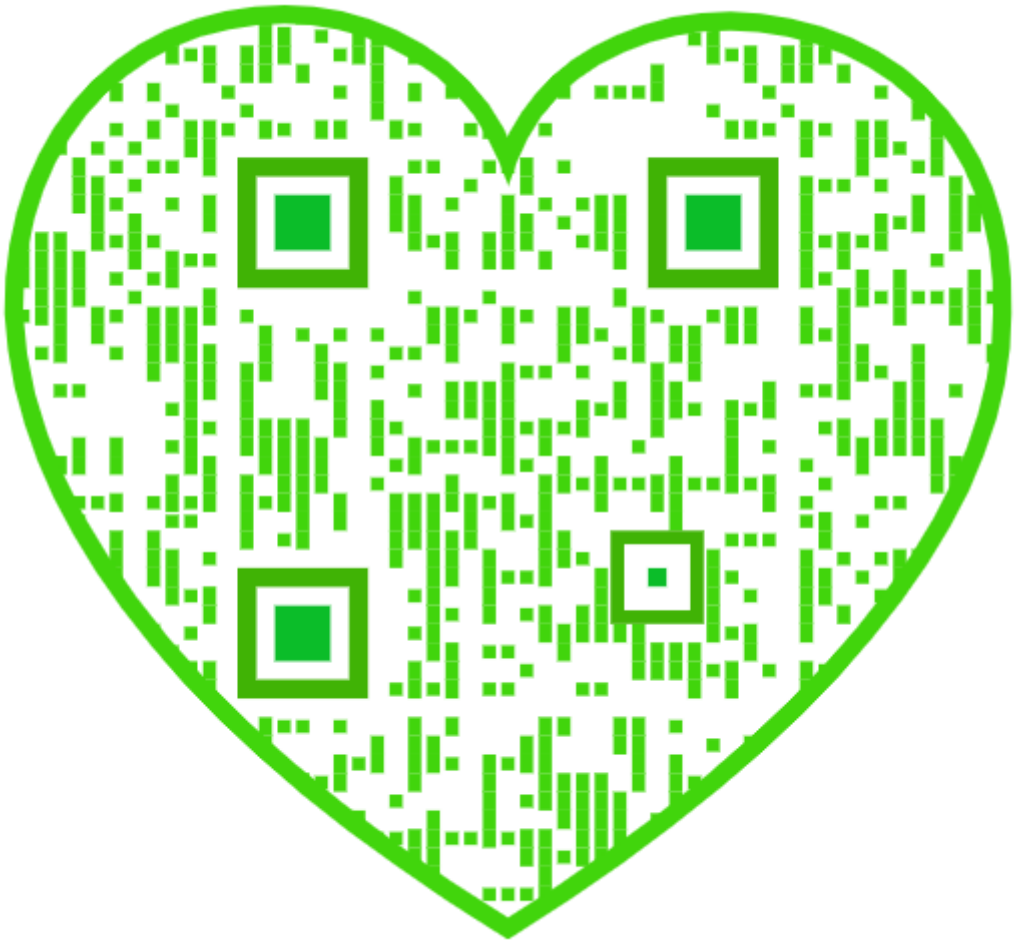

ENGRAVING WITH A SUNBEAM.

This is assuredly the age of scientific wonders. If in point of philosophic abstraction our generation is somewhat inferior to preceding ones, in all that concerns the practical application of theories it is far in advance of its predecessors. Our modern *savans* are of the utilitarian school, and they seek rather to discover the mode in which scientific speculations may be made subservient to the comforts of man, than to frame generalizations which have only an abstract importance. How far this condition is to be admired we do not pretend to say. The contemplation of Nature's works, and the search for the laws by which she controls the universe, are pursuits of the sublimest type; but in these days the man who is completely absorbed by them is often looked on as a dreamer—as one who does not take his rank in the race of life. Whether it be that transatlantic tendencies have taken possession of us or not it is difficult to determine, but one thing is certain, we of the nineteenth century pride ourselves above all things upon being "practical men." Need we adduce proofs that the *utile* is the fetish of the age? Can we not flash our thoughts with the rapidity of lightning to the remotest portions of the globe? Nay, can we not even cause them to be written down in enduring letters by Casselli's recording telegraph? Have we not turned the spectroscope toward the sun and stars, and investigated their chemical constitution? Do not our microscopes, in fulfilling the highest anticipations of optical theorists, enable us almost to penetrate into the molecular condition of matter? Can we not with the most rigid accuracy forecast the hurricane, explore the bowels of the earth, and examine the very recesses of the human frame? These surely are sufficient examples of the practical science of to-day.

There is, however, another instance which, from its familiarity and the infinity of its possible applications, is better testimony to what we have said than any of the foregoing—we allude to the art of sun-painting. Photography, which is the application of a very simple chemical principle, has done, and promises to do, more for man than any other invention save that of the steam-engine. Already it has lent its aid to the painter, the sculptor, the philosopher; but it now extends its sphere of usefulness, and gives a helping hand to "the arts," properly so called. By M. Willieme's curious apparatus, photography has been made to do the greater portion of the work formerly achieved by the sculptor's chisel. Through the exertions of Mr. Brooke, it has been made the handmaid of meteorology—the records of the various indications of scientific instruments being now intrusted to this "genius of the lamp." It is wonderful to think that, through the long hours of the night, when the whole world is at rest, photography takes the place of human labor, and moment by moment writes down a history of the natural phenomena which are taking place around us; yet this is no freak of the imagination. In the Royal Observatory at Greenwich the night assistants have been, in a great measure, done away with, and the unerring pen of photography records, in legible and truthful symbols, the operations of the physical universe. The combination of lithography and sun-painting is another important illustration of what photography has done. Photo-lithography is undoubtedly a most useful application of the art, but its field of action is a limited one. When a picture in black and white alone is required, the process of photo-lithography is admirably adapted to the cheap reproduction of the original representation. But when it is necessary to preserve a variety of gradations of shading—when a number of half-tints have to be delineated—the photo-lithograph cannot be employed.

One of the most valuable qualities which photography possesses is its precision. By it we get an undeniably faithful picture of the object portrayed, and one whose accuracy can never be called in question. Therefore, in all pictorial illustrations which are not merely works of the imagination, photography surpasses the pencil in truthfulness, and would necessarily be universally employed were it not for the time and expense attending the production of copies on a large scale. To illustrate cheap works by photography alone, would necessitate an expenditure which no experienced publisher would dream of. This difficulty of reproduction, then, has hitherto trammeled the application of photography to literary purposes. We say hitherto, for a new invention removes all obstacles, and henceforth we hope to see the reliable labors of the photographer substituted for the less assuring results of the pencil and the graving-tool.

The title of our article is by no means figurative. We can now dispense with the engraver, and employ the sunbeam in his stead. The new process by which this revolution is to be effected is that of Mr. Walter Woodbury, and has been recently described in the scientific journals. As it is not a complex one, we shall try and convey an idea of its general features. In taking an ordinary photograph, a solution of silver is placed upon glass, and has projected on it, through the medium of a camera obscura, an image of some object which it is desired to represent. This image consists of several combinations of light and shade, and as the effect of light is to darken the silver solution by decomposing it, the lightest shades (those most illuminated) are represented on the glass plate by dark portions, and the dark shades, being less decomposed, are fainter. In this case, the object photographed has been represented by lights and shades. There are, however, certain combinations other than those of silver, which are differently affected by light. Now, a compound of gelatin and bichromate of ammonia is one of these. When this is exposed to the action of light, it becomes perfectly insoluble; so that when a photograph taken with it is placed in hot water, those parts which were least exposed are dissolved away, and those submitted to the light remain, thus leaving a representation in relief. Upon this quality of bichromatized gelatin depends the principal feature in the new process. In the first instance, a negative (that is, a photograph of a special kind on glass) is taken of the picture or object of which it is wished to obtain an engraving, and this is placed over a plate of talc, bearing a stratum of the prepared gelatin, and in this position exposed to the light. The sun's rays, in passing through the negative, fall upon the gelatin, with various intensity, hardening the parts least covered, and leaving those parts unaltered which are completely protected by the shadows of the negative. After sufficient exposure, the gelatin plate is removed and placed in hot water, which dissolves away all those parts unacted on by the sun, leaves those completely exposed intact, and partially removes the portions of the plate which were slightly protected. When, therefore, the gelatin plate, with its support of talc, is removed from the water, it presents a series of elevations and depressions which exactly correspond in extent and hight to the lights and shade of the picture. It is, in fact, an intaglio plate in gelatin, but one which, as its depressions correspond to the light portions of the picture, cannot be used for engraving. A cast must be taken; and this is effected either by metallic deposition, as in electrotyping, or by pressing the hardest gelatin plate into one of soft lead. The latter method is the one which Mr. Woodbury employs, and although it seems hard to believe, it is unquestionably the fact that by pressure alone a perfect impression of the gelatin is produced on type metal.

The next stage in the process is that of printing. An intaglio block, *i. e.*, one in which the depressions are to be filled with ink and the surface to be left clean, has been produced, but it remains to be shown how it is used. If it were simply coated with ordinary printing ink the "proof" would be as devoid of half-tones as the worst photo-lithograph, and therefore a peculiar ink, suggested many years ago by M. Gaudin, is employed. This ink consists of gelatin holding coloring matter, of whatever hue is desired, in solution; it is a translucent preparation and is not densely colored. This compound is poured into the intaglio mold—for a mold it really is—and the latter is pressed down upon the paper which is to receive the print. The ink, which has become semi-solid, falls from the depressions in the block somewhat in the manner of jelly from a jelly-mold, and soaks into the paper. In this way the deepest depressions, corresponding to the darkest shades, throw down the greatest number of layers of ink, and the shallowest ones the least; so that a picture is produced in which even the most delicate half-tints are exquisitely brought out. Indeed, the result is somewhat similar to that of "washing" in water-color painting, the greatest quantity of color producing the greatest shade, and conversely—every tint in the gradation being preserved.

The inventor of the exceedingly ingenious method we have described considers that one man at work with four "presses" could produce as many as one hundred and twenty prints per hour, and at a cost which would be very trifling. If in practice Mr. Woodbury's process turns out as successful results as those we have already seen, we have no doubt of its coming into general use. At present we can only testify to the beauty and perfection of the specimens we have inspected.—*London Review.*

Thermo-electric Battery.

The *London Engineer* says:—A thermo-electric battery, of much greater power than it has hitherto been thought possible to obtain by heating dissimilar metals at the point of junction, is now in daily use in one of the lectures of Mr. King, at the Polytechnic Institution. It is the invention of an Austrian engineer, who has had several honors conferred upon him for having brought his researches to such a successful result. The bars of metal in the battery consist of two alloys, one containing a large proportion of antimony with a little bismuth and zinc, and the other the same proportions of bismuth and zinc, with a very large admixture of copper. The pairs of bars are mounted on a frame, and the metals heated at the point of junction by a row of jets, burning a mixture of gas and common air. Instead of the feeble—almost inappreciable—effects of all earlier thermo-electric batteries, this one will not only give a long spark with a good induction coil, but will enable an electro-magnet to hold a bar of iron with such power that a strong man can scarcely release it. This fact indicates that a current of considerable quantity as well as intensity is produced; yet this effect, according to Mr. King, is not accompanied by a corresponding waste of the most oxidizable of the alloys employed in the battery. The electricity, in such case, would seem to come from the heat alone—a very inexpensive source; and, in the commercial interests of telegraphy, it is to be regretted that the power of the apparatus has not been measured by a galvanometer and set of resistance coils, whence data could be obtained from which to judge of the practical utility of the new battery. The current from it will certainly work a short line of telegraph efficiently, and, judging by appearances, a long one also.

Exhibition of Polarized Light to a Large Audience.

In addition to the somewhat abstruse subject of thermo-electricity, Prof. Pepper has introduced a lecture, with brilliant experiments, on all the most gorgeous phenomena of polarized light. For a long time great difficulty was found, in the way of constructing an apparatus, to show these phenomena to large audiences; but this impediment has been, to a great extent, overcome. A ray of light from an oxy-hydrogen burner placed in a dark lantern is allowed to fall on a bundle of eighteen plates of glass, fixed at the polarizing angle. The refracted ray is absorbed, and the reflected ray thrown upon a large white screen facing the audience. The substance to be viewed is, of course, placed between the polarized ray and the screen, and an analyzer of Iceland spar, plates of glass, or tourmaline, used to produce the colors. Several crystals are exhibited, cut with great care and expense, showing the different colors of layers of varying thickness. One, especially, is cut with such extreme delicacy that it represents on the screen a white man in a white dress, and, on turning it round, a black man in a black dress. Some delicate models are also exhibited, giving a clear idea of the manner in which rays of light travel through space according to the undulatory theory. Prof. Pepper states that it is his intention to continue at the Polytechnic a series of these high-class lectures, which are decidedly far superior in tone to many that have been presented, during the past few years, at this favorite place of public resort. He says truly, that by such lectures alone can the Polytechnic uphold its ancient name and fame as a really scientific institution.

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DIFFERENTIAL PULLEY BLOCKS.

This invention was the subject of a recent patent trial in England which has attracted a great deal of attention. In relation to it the London *Engineer* remarks:—

"Scarcely any new mechanical apparatus has ever worked its way so quickly into general use as the extremely elegant and ingenious form of hoisting tackle known under the name of Weston's Differential Pulley Blocks. It is stated—and we have no reason to doubt the statement—that not less than 26,000 sets have been sold within the last four years. Such a demand could not have arisen without a good cause, and it is probable that no workshop in this country is without a set. At Crewe Mr. Ramsbottom has adapted the differential pulley blocks to most of the lathes. A T-rail, set at right angles to the lathe bed, and at such a distance as to suit the face plate, affords the greatest convenience for adjusting the work. It is the fact, however, of their general use in unskilled hands which still more strongly testifies to their utility. As was observed by a scientific witness at the late trial, 'In engine houses, where formerly crabs were used, and it required perhaps half-a-dozen men to lift up the cylinder cover of the air-pump bucket for re-packing them, a couple of men can, with these blocks, now easily do the work.' The ropes of crabs are liable to break, and many an accident has occured with a winch handle; but it is probable that scarcely any like occurrence has ever taken place with these blocks. In corn mills similar facilities are afforded for lifting up the runner for dressing the surfaces; and they are accordingly in extensive use by millers. Besides many other applications, they are of course extensively used by builders.

"Such a rapid development of the sale of a new article never takes place without the stimulus of a patent, without a greater or less number of persons being specially interested in making its principle and adaptabilities generally known. It is a further consequence that others are led to covet that intellectual property which *is*, or ought to be, covered by patent specification. A similarly general feature in most mechanical contrivances is, that they but seldom leap with Minerva-like completion from the inventor's brain, and that they have had a previous history, made up of a greater or less number of crude development. Previous inventors, with less perseverance and the other virtues requsite for success in the arena of invention, have made more or less incomplete attempts. In the fiery ordeal of a court of law the successful contrivance has thus to confront its previous history, so to speak; and the patent right of the last inventor—who may or who may not have given it that finishing touch which makes all the difference between practicability and impracticability—has to stand or fall by the result. Such is the general type of many of the patent contests in our courts of law, and the general features in the case of Tangye *vs.* Stott were repetitions of those previous patent cases.

"A brief repetition of the history of the progressive development will, thus give a clear notion of that portion of the defendant's case which could be said to be founded on *bona fide* statements. It is needless to describe at length the principle of the Weston's differential pulley blocks. Like most other things, its origin can be traced back to Chinese invention; under the name of the Chinese Windlass it has been known for centuries; and, like most other Chinese inventions, it has remained in an incomplete state for ages. It is not, perhaps, generally known that a windlass of the kind was found by the Allies to be in use for raising one of the drawbridges of the city of Pekin. The enormous quantity of rope it requires has, says Professor Willis, 'been sufficient to banish the contrivance from practice,' at least in Europe.

"The beautiful principle of its differential motion should, however, one would have thought, have long ago directed the attention of mechanics to the practical developement, by the aid of the modern command over less clumsy materials than wood and hemp, of the Chinese windlass. The first man who appears to have attempted this was Mr. Moore, of Bristol—apparently an ingenious schemer and amateur mechanic. What he produced was indeed a pulley block, embodying the differential principle, and worked by chain. He stated in evidence that he invented it in 1830; that a model of it was deposited at the British Philosophical Institute at the Adelaide Gallery, and other places. It was also stated that such a pulley had been practically used. This pulley block was further described in a passage in a work by Dr. Carpenter, entitled 'Mechanical Philosophy, Horology, and Astronomy,' published in 1844.

"After evidence showing clearly that Weston's invention resulted in little less than the development of previously barren ideas—that it was not merely a considerable difference, but also as great an advance on Moore's apparatus—the issue could scarcely be doubtful. With a verdict for the plaintiff has thus ended one of the most remarkable patent trials which have lately occurred, whether we regard the importance of the issues or the sensational character of one portion of the evidence. But stranger than any thing which did really occur would have been a completely realized supposition that such a simple and efficient contrivance could remain buried for more than a quarter of a century in a popular work on science, and on the shelves of popular resorts for scientific information."

NEW PUBLICATIONS.

MANUAL OF THE ALDEN TYPE-SETTING AND TYPE-DISTRIBUTING MACHINE. An illustrated exposition of its mechanism, with tabular statements of the weight of every piece, including estimates of cost of labor and material, a summary of the amount of type setting annually executed, an authentic sketch of the history and progress of the invention, with a proposed plan of future operations for the Alden Type-setting and Distributing Machine Company. By Charles C. Yeaton. New York: Francis Hart & Co.

The volume under notice is a new thing in literature, and marks an advance in the mechanic arts. It is in verity an immense factory on paper, and yet in full operation, each thing to be done and tool for doing it being minutely and exactly described in form, material, weight, cost, and durability; and all the directions so clear that any good mechanic in any country, by simply following its directions, could start a factory for the production of five Alden Type-setting and Type-distributing Machines every day, without any previous instruction, just as well as though he had served on the machine from its first imperfect inception in the mind of Timothy Alden to its magnificent completion under Mr. Charles C. Yeaton, who has left us the record of his progress, and the men who labored on it, in these pages. No work of a similar kind has ever heretofore been seen, to our knowledge; but that the example it gives, for the most efficient organization and economical management of large manufacturing interests, will be widely and promptly followed, is just as certain as that all intelligent manufacturers will avail themselves of all important aids and economies in the prosecution of their business. Our factory system, as now existing, is not one that is organized or created as a whole, but that has "growed up," like "Topsy," from small beginnings to large proportions, through the personal experience and labors of its governing minds. No sound rules for its continuance are on record, save in the individual heads of the foremen or master mechanics to whom each branch of the work is intrusted; and thus it comes to pass that when any one of these may die or be discharged, there is found serious difficulty in finding any one competent to fill his place; and both the goodness and economy of the manufacture fluctuate as the men immediately employed in its direction have more or less skill and experience. In Mr. Yeaton's book this manufacturing difficulty is boldly grappled with and abolished. He has a machine of infinite complexity of parts, and yet the greatest simplicity of principle, to construct; and thoroughly understanding the subject himself, in all its theoretical and practical workings, has put on record in this volume instructions so clear and tables so minute for the performance and cost of every item of the wonderful semi-automaton, that a thousand factories could be started to-morrow, by as many first-class mechanics, with only this book to guide them; and if they followed its instructions, each factory would be as good as every other, the machines they would construct would be precisely similar, the minutest parts of their machines would be interchangeable without detriment or irregularity, and the cost of production in any country could only differ from the cost in other countries by variations in the value of labor and materials. That such a code, for the regulation of a single branch of manufacture as is here given, must in time produce a change in the management of all factories and the general organization of mechanical industry, we hold to be beyond dispute. Factory owners will see in the production of similar volumes, each for the control and guidance of his own branch of business, the immediate attainment of the following important desiderata:—Uniformity in the work performed; the strictest economy, free from parsimony, in its performance; independence of the changes and chances which affect the lives and labors of the managing foremen in important situations; and the ability either to start similar factories, if desirable, with new men who shall be equally good with the most experienced hands under such instructions, or to transmit their business to an heir, or to some new purchaser, with no apprehension that the change of individuals in control will produce any change or deterioration in the quality or economy of the manufactured article. Of the Alden Machine we gave an illustration, with an accompanying verbograph or word-picture, in a previous number, and then pronounced it one of the greatest and most curious triumphs of mechanical ingenuity and the heroism of undaunted perseverance. In the volume under notice—of which but one hundred copies have been printed, altogether for the use of the Alden Machine stockholders and the guidance of their factories here and in Europe—we see how the great task of its successful prosecution has been pushed to success, and recognize in the mind of the writer those habits of order, indefatigable industry, and a courage quailing before no obstacles, without which the imperfect and unfinished discovery of Timothy Alden must have "died and made no sign," or simply remained to be scrutinized by the few as a curious but unsuccessful illustration of inventive genius.

MISCELLANEOUS SUMMARY.

WHEN oxygen is converted into ozone, by passing through it a current of electricity, a diminution of volume takes place. The greatest contraction occurs with the silent discharge, and amounts to about 1-35th of the volume of the gas. The passage of sparks has less effect than the silent discharge, and will even distroy a part of the contraction obtained by the latter. If the apparatus be exposed for a short time to the temperature of 250 degs. centigrade so as to destroy the ozone, it will be found that the gas on cooling has recovered exactly its original volume.

WHILE experimenting on the qualities of silver present in sea water, Mr. Field, F.C.S., stated that he had examined some Muntz's metal sheathings which he had obtained from the captain of the brig *Nina*, which had been some time in the Pacific. In 1,700 gr. of sea water, he found ·003 per cent of silver or 19 dwt. 14 gr. per tun, while, in examining the same quantity of metal which had been fastened to the ship's bottom, he found ·023 per cent, or 7 oz. 13 dwt. 1 gr. per tun.

CYRUS H. MCCORMICK, of Chicago, the well known inventor of McCormick's reaper, has given $10,000 for the establishment of a professorship of practical mechanics in Washington College, of which Gen. Lee is the President. McCormick is a native of Rockbridge County, Virginia.

A COMPANY, with a capital stock of three hundred thousand dollars, has been formed in St. Paul, Minn., for the purpose of working in the newly discovered gold mines of that State.

FROM Professor Airy's pendulum experiments at Harton Colliery, the mean specific gravity of the earth is found to be 6·566.

WHILE American farmers are trying all sorts of bushes and shrubs for live fences, English farmers are rooting them out, as cumberers of the ground.

OVER two hundred mechanics and operatives are in constant attendance at the Cincinnati School of Design.

IT is estimated that thirty tuns of white paper are used daily in the manufacture of paper collars.

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THE FOOT LATHE.

Number 7.

We shall now proceed to give some examples of turning different things which are useful and interesting to work. These are only hints, and we make no claim to discovery, or to any thing specially novel or ingenious. It would be very foolish to do that, for what seems remarkably "cute" to the designer of any particular thing, is often shown to be slow and unmechanical, compared to other ways by other men. We hope, therefore, that the expert will bear in mind the fact that, while he may know better ways to do the same thing, beginners are glad to receive inst uction first, and improve upon it so much as they are able after.

To Make a Pair of Solitaire Sleeve Buttons.—*Solitaire* buttons are those which have so lately come in fashion; that is, a single stud with two eyes on the back for the button-holes of the wristband. It is easier to make one stud on the back of the button, and easier to fasten it to the shirt, as that is the kind we shall describe.

Go to any dealer in box-wood and procure waste stuff which he will sell at a small price. Take a piece an inch square, put it in the chuck, and turn it round on one end as far as you can, then reverse it, and turn the other end; this will make a round plug. Take a ten-cent piece, and chuck it, either in a wooden or scroll chuck. Cut out the center so that you have a silver ring. It will be necessary to have two rings, one for each button. Put the box-wood in

Fig. 34.

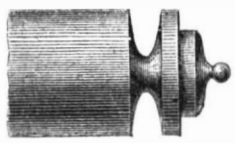

Fig. 35.

the lathe and turn the end, as in Fig. 35. On the shoulder you are to shrink the silver ring just made. To fasten the ring properly you have only to leave the center part of the box-wood a little larger than the silver ring—say the thickness of a sheet of paper—heat the ring slightly on a stove or over a spirit lamp, and clap it on to its place. When it is cool, if properly done, no power can remove it without destroying the button. When the ring is in place it only remains to turn it off as ornamentally as the workman desires. The edge may be milled and the face chased or left smooth. The center of the button, which is of wood, may be drilled in, and a square ebony plug put in, which will give it a unique appearance, as shown in this figure. In like manner ivory buttons may be turned and breastpins spun up either in gold or silver. Brass breastpins may be ornately turned and afterward electro-plated for a trifle. They will thus be cheaply made, and the ingenious turner can please his lady friends by presenting them with specimens of his dexterity and taste.

Fig. 36.

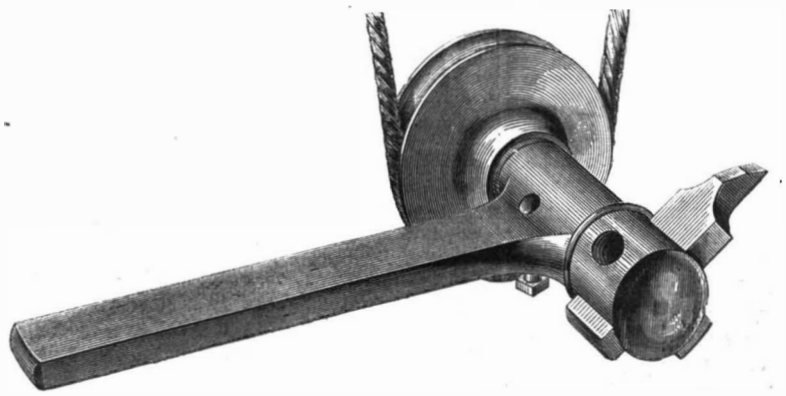

Fig. 37.

At the commencement of this series of articles we alluded to lathes with traversing mandrels, and to varieties of work done by tools not generally employed—that is, those which are not used by the hand, but in connection with the lathe, and driven by belting from a counter shaft overhead. We give an illustration of such a tool in one form in Fig. 37. It may be screwed in the tool post of the slide rest, or otherwise attached to the lathe, and the belt from the counter shaft carried over the small pulley. The driving pulley overhead should be very large, so as to give a great velocity to the cutter, at least 1,500 revolutions per minute. The use of this tool is to make ornamental designs—circular carving it might be called—on all kinds of turned work, as, for instance, in this figure, where a small box for pins or needles is shown. This box is made by putting a piece of hard fine-grained wood in the chuck, boring the hole and cutting the thread. It is then removed, driven on a round mandrel held in the chuck, turned off round outside, and then prepared for the pattern as follows:—The design settled upon, the index plate must be brought into use, and the points inserted in such holes as will bring the pattern out right or all the spaces equal—just as the teeth of gears are cut. The tool shown in Fig. 37 may be any desired shape. In the example of work, Fig. 38, it is made half round, and the pattern is called "bamboo," from a resemblance to wickerwork. The pattern is made to break joint, as mechanics say, that is it alternates, so that the commencement of one part meets in the middle of the other. After one course is made all the way round, the tool is shifted on to another course, and the index changed as above mentioned until the whole has been gone over. This produces a beautiful effect.

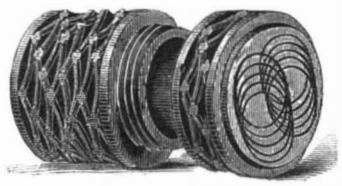

Fig. 38.

It is easy to see that a change of pattern is produced at will by altering the kind of tool and the index. As, for instance, in this other figure—

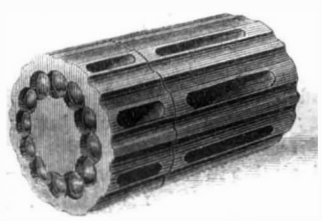

Fig. 39.

where the pattern is entirely straight. When the design is to be cut on such work it is extremely convenient to have a pair of centers to set on the lathe across the bed; then the flying tool is not needed, nor the index on the lathe pulleys either, that on the centers being used instead. When this box is held between the centers so as not to mar it, the handle may be turned and the work run along under the cutter with great facility. The grooves shown in the box are first drilled at each end with a common drill just to the corner of the drill, so that a neat and handsome finish is given; a V-shaped cutter is then put in a mandrel between the centers of the lathe, and the pulleys set going, so that when the work is run under the tool, the slot or groove will be formed. The circlet at the top of the box is made by a crescent drill ground very thin and made sharp—a drill like a fish's tail, only formed on a half circle.

Of course these methods of doing this kind of work can, as we have said before, be varied infinitely, and are only cited as applicable to a common foot lathe.

[To be continued.]

Making Butter without Churning.—Dr. Sylvester stated, at a late meeting of the American Institute Farmers' Club, that he had tried the experiment of making butter by burying the cream in the ground. He put the cream in a linen bag and that in another bag to keep it clean, which he buried about eighteen inches deep, and after twenty-four hours took it up and found the cream as thoroughly converted into butter as it is by churning. It was just in the condition that butter is when it is "come" without being gathered by the dasher. It was worked in the usual way, and made as good butter as ever was churned.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

THE HYDRAULIC PROPERTIES OF MAGNESIA.

The discovery mentioned in last weeks "Notes," of the remarkable hydraulic properties of magnesia, seems to have been made quite by accident. About seven years ago, M. Donny sent to M. Henri Sainte-Claire Deville some compact anhydrous lumps of magnesia, which he had obtained by calcining chloride of magnesium, and it happened that some of these lumps got placed under a tap in M. Deville's laboratory and were thus constantly exposed to running water. After some months of such exposure they were examined, and were found to have become as translucent as alabaster, and hard enough to scratch marble. This was six years ago, and M. Deville was recently led to examine them again, when he found that six years' exposure to the air had not in the least changed them. He analyzed them, and found them to contain 27·5 per cent water, 8·3 per cent carbonic acid, 1·3 per cent alumina and oxide of iron, 57·1 per cent magnesia, and 5·6 per cent of sand. He concluded that they were essentially a crystallized hydrate of magnesia, resembling the mineral brucite, which does not absorb carbonic acid, and he proceeded to test the soundness of this conclusion by making powdered magnesia, obtained by calcination of the nitrate, into a paste with distilled water, and sealing this paste with some more distilled water in a glass tube. At the end of a few weeks the magnesia thus treated was found to have become quite as compact, hard, and translucent as the lumps above spoken of, and on analysis it was found to be a simple hydrate of magnesia containing 69·3 per cent of magnesia and 30·7 per cent of water. This led M. Deville to try a great number of experiments with magnesia from various sources, and also with various mixtures of magnesia and other substances. He found that a mixture of magnesia and plaster of paris does not set under water, but that a mixture of magnesia with powdered chalk or marble forms with water a plastic mass, which by exposure to water for some time—he does not specify how long—becomes converted into a kind of extremely hard artificial marble. The magnesia which he found to form, by hydration, the hardest compound, is that known in France as "Balard's magnesia," being magnesia prepared by calcination of the chloride of magnesium which M. Balard obtains so ingeniously from the mother-liquors of sea water. This magnesia exhibits its astonishing hydraulic qualities in the highest degree when it has not been exposed to a heat above redness, exposure to a white heat dimishing its hydraulicity. The results of greatest practical moment, however, are those which M. Deville obtained with dolomite, which abundant natural compound, after being calcined at a heat below dull redness, powdered, and made into a paste with water, "forms under water a stone of extraordinary hardness." If the dolomite be heated to bright redness, so as to decarbonate the lime of the compound, as well as its magnesia, the paste formed with it does not set under water. The lime of the compound should remain in the state of carbonate, and only the magnesia be deprived of carbonic acid, then, the magnesia, in undergoing hydration, or combination with water, not only becomes hard itself, but in so doing binds together the particles of the carbonate of lime, and the result is a compact, homogeneous, and intensely hard artificial stone, upon which, when once formed, neither fresh water nor sea water has the slightest action—so far, at least, as can be at present judged. Dolomite exists so abundantly—there is one bed of it in this country which is not less than one hundred and fi[illegible] miles long, and is in some places six hundred fe[illegible] thick—that M. Deville's discovery of the new use it can be turned to cannot but prove of very great practical value.—*Mechanics' Magazine.*

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KELLER AND HENDERSON'S ICE-MAKING APPARATUS.

Messrs. Charles M. Keller and James Henderson, of this city, have recently invented an apparatus for making ice, by means of which they claim that ice may be produced either in the city or country, in unlimited quantities, with smaller capital and at less cost than it can be produced by any of the large companies who now supply it from lakes, ponds, and rivers. The only requisites are the apparatus, pure water, and the atmosphere below the freezing point. Blocks of a uniform size and weight can be made convenient for transportation, sale, and use, and distributed to the consumer without the trouble of weighing, or loss by breaking or melting.

This invention combines the action of heat by radiation, conduction, and evaporation to a number of water and metallic surfaces by the atmosphere, when below the freezing point.

The application is effected by placing water in cast-iron or other metallic vessels, with either rough or corrugated surfaces, about twelve inches square, varying from two to eight inches deep, made rather smaller at bottom than at the top, to facilitate removal of the ice. These vessels are suspended by their rims, and filled with water; the cold of the atmosphere, acting with almost equal effect on the bottom and the sides, converts the water into solid blocks of ice with great rapidity, and at times when none can be formed upon ponds. The effect may be increased by making a central hollow space in the vessel, rising from the bottom to the level of the top surface, thus making more surfaces for the air to act upon.

The frames in which the vessels are placed are made upright, with spaces about six inches or more apart, for suspending the vessels by their rims; this may be hung on trunnions so as to revolve and discharge the ice.

Vessels may be formed of the same size with a projection from the bottom to within from one to three inches of the top surface, so that when the vessel is filled the water will cover this projection to this depth. When it is frozen on the top about an inch thick the block may be removed and placed on a frame with bottom uppermost, to finish freezing, and the vessel may be refilled; in this way a larger number of blocks can be produced from one vessel than if they remained in it until frozen solid. Another advantage is gained by the expansion of the water within the partially frozen block in freezing, filling up the space made in the block by the projection in the pan. The block also freezes faster because the surface of ice is a better radiator than one of metal.

In locations where there is not much frost it will be found advantageous to use artificial currents of air to aid in the operation. These can be produced by working the vessels in the frames rapidly through the air, or the air forced over them by means of a rotating fan or other blowing apparatus, the effect being the same whether the air passes through them or they are passed through it. Another mode of producing an artificial current of air is to construct the side of the building, where the freezing operation is carried on, with movable boarding mounted on frames, so that an opening and closing action is communicated to the boards in order to create a draught of air through the building.

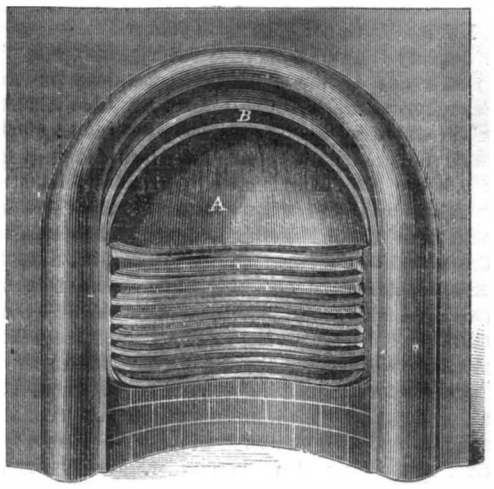
The inventors say that it has been found, by careful estimates, that the ice can be produced and stored away in the city of New York, with present rates of labor, at a cost not to exceed 50 cents per ton, and in localities convenient for distribution. The apparatus may be seen at No. 218 Fulton street, Room No. 4, New York.

METALLIC TITANIUM.—Within the past few months titanium metal is stated to have been obtained in considerable quantities in Birmingham, by reduction with sodium, the resulting powder being fused into compact masses of large size; the similarity of titanium and iron is striking. Little doubt is entertained that ere long the new metal will be produced at about the price of silver, in which case many practical applications could, probably, be found for it. The metal is largely disseminated in nature, so that once introduced a constant supply could be depended on.

HABERMEHL'S ELIPTIC GRATE.

The grate illustrated herewith is a recent invention intended to economize fuel by properly burning it. It is no exaggeration to say that one-half the coal put on fires is wasted from defective combustion in the stove, furnace, or grate, and that instead of changing into ashes, almost impalpable to the touch,

Fig. 1



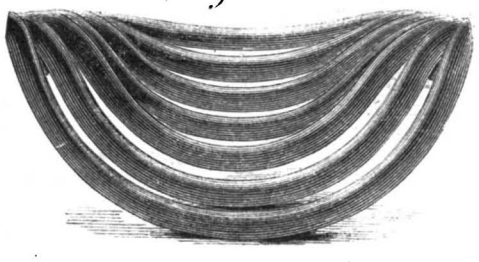
it is converted into heaps of cinders or coke. At the present prices of fuel, any thing tending to save it will certainly be an acquisition.

The grate here shown has been well tried and not found wanting. As an experiment it has been successful. It is difficult to give a clear idea of the shape of this grate, nevertheless it is easy to understand that the bars are not placed one over the other vertically, as in common grates, but that each is set a little behind, as in the view from the bottom, Fig.

Fig. 2

3. This exposes the fuel to the air very perfectly, allows it to be thoroughly mixed with the incandescent fuel, and does not crowd the coal into a compact mass. By this arrangement of the bars, also, a perfect draft is obtained, at the same time the fuel is not allowed to drop out half burned.

Fig. 3



The fire back, A, Fig. 1, is made of fire-clay, and is concave—this being the best form, the inventor claims, to radiate heat—and the semicircular opening, B, above, gives a long narrow throat which, we are assured, accelerates the draught greatly. This throat latch, C, Fig. 2, is very conveniently arranged to open or shut. It is connected to a lever, D, which operates from the front, so that the old-fashioned abomination, in the shape of a flat piece of cast iron, is done away with.

As we stated before, this grate has proved highly satisfactory in Wheeling, Va., and is now in use there in many houses. The inventor states that he has introduced it in rooms where the chimneys formerly smoked, and that the evil was cured thereby.

The grate is manufactured by Henry Anshutz, proprietor of the Lafayette Foundery, Pittsburgh, Pa.; and the inventor, John Habermehl, of the same place, wishes to enter into arrangements with other parties.

The invention was patented through the Scientific American Patent Agency, May 30, 1865.

Explaining Government Securities.

Thompson's *Bank Note Reporter* gives the following explanation of the Government securities which we doubt not will interest many of our readers:—

"The 7-30 Treasury Notes have three years to run from their dates. The first series is dated Aug. 15, 1864; the second series, June 15, 1865; and the third series, July 15, 1865.

"When due, these notes are payable in money or they are fundable into a 5-20-year bond bearing six per cent in gold. It is optional with the holders of the notes whether to fund them or take the money. The interest is payable every six months from the date of the notes. The amount of the different dates or series is as follows:—

Aug. 15, 1st series	$300,000,000
June 15, 2d series	300,000,000
July 15, 3d series	230,000,000
Total	$830,000,000

"Consequently, the interest on the June notes is payable Dec. 15th; on the July notes, Jan. 15th; and on the Aug. notes, Feb. 15th.

"The 5-20-year six per-cent bonds are of three issues, payable after five years from their date. The Government has the option to pay them off or to let them run to maturity, which is twenty years from their date. Observe that the Government can act at any time on this option after the first five years from date. It is this feature of the bonds that gives the name of 5-20s. They all bear six per cent interest in gold, payable May and November:—

First, series (old), dated 1862	$514,780,500
Second series (new), dated 1864	100,000,000
Third series (newest), dated 1865	55,000,000

"From the conditions above set forth it is plain that the 'new' and 'newest' issues are the most desirable bonds. The 'old' issues are bought to fill foreign orders with, and this is the only reason why they bring a better price.

"The bonds of 1881 have till that year to run with no power on the part of the Government to pay them off before they mature. They bear six per cent interest in gold, payable Jan. and July. The total of these bonds is $198,746,400.

"The 10-40 five per cent bonds are called 10-40s because the Government can pay them off at any time after ten years from their date, which is March 1, 1864. They bear gold interest, payable March and September.

"Compound interest notes have become a desirable investment. There are a good many issues of these notes—we give a table of them:—

Dates.	Maturity.	Interest already earned.	Market price
June 10, 1864.	June 10, 1867.	8⅜ per ct.	105 @ 105⅜
July 15, 1864.	July 15, 1867.	8¼ per ct.	104¼ @ 104½
Aug. 15, 1864.	Aug. 15, 1867.	7¾ per ct.	103⅜ @ 104
Oct. 15, 1864.	Oct. 15, 1867.	6¼ per ct.	102½ @ 103
Dec. 15, 1864.	Dec. 15, 1867.	5⅜ per ct.	101¾ @ 102

"Of the notes dated in 1864, there are about 145 millions outstanding; and there are some 25 millions dated in 1865, but these latter do not as yet bear much premium."

THE body of an average-sized man presents a surface of about 2,160 square inches, or fifteen square feet, and consequently sustains at the sea level a total atmospheric pressure of 34,400 pounds, or nearly 14 tuns and a half.

PROF. SCHMID, of the University of Jena, has calcalculated the weight of the atmosphere, omitting its watery vapor and carbureted hydrogen, at 612,489,851,187,051 tuns.

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Correspondence

Casting Car Wheels.

MESSRS. EDITORS:—Several accidents of a very bad nature have happened on railroads in my neighborhood, by which a number of lives were sacrificed by reason of car wheels breaking while the trains were in motion. It may therefore be of advantage to railroad managers to know how the best car wheels can be made. The preference should certainly be given to a wrought-iron wheel, but the high price of such a wheel has kept them out of use in the railroads of this country. The next best undoubtedly are those made at reverberatory furnaces.

A series of experiments made under the directions of scientific officers of the United States Ordnance Corps resulted in the rejection of cannon ball and shell cast from a cupola furnace, as it was found that charcoal pig, with a tensile strength of twenty-six thousand pounds to the square inch, after remelting in a cupola furnace, assumed all the qualities and appearance of anthracite iron, and only gave a tensile strength of eighteen thousand pounds to the square inch, whereas the same iron remelted in a reverberatory furnace increased in tensile strength to twenty-eight and thirty thousand pounds to the square inch.

Railroad managers can have specimens taken out of old wheels, and have the tensile strength ascertained so that they may know exactly what strength the wheel they have been using possesses, and, considering the importance of the matter to themselves and the public, it might be to their advantage to occasionally take a specimen from a new wheel and ascertain its breaking strength, and indeed it is a question whether it would not be sound policy to do so with every lot of wheels which are purchased.

Those who know the extraordinary tests which ordnance iron is now submitted to by the Government contractors of ordnance, can only appreciate the importance of railroad companies using more care in the selection of car wheels than has heretofore been their custom. H.

Reading, Pa.

[If our correspondent's allegations are correct, we suspect the railroad companies in our correspondent's neighborhood are rather behind the times. There is no other article so simple as a car wheel that has had so much attention directed to its improvement, and with pretty satisfactory results. Though accidents from the breaking of car wheels were formerly quite frequent, they are surprisingly rare at the present time. A high tensile strength is not the quality so essential in a car wheel as toughness. —EDS.

Plating Iron with Copper.

MESSRS. EDITORS:—In your number of January 13th, you speak of the deposit of copper on iron obtained by simple immersion of a piece of iron in a solution of sulphate of copper. The adhesion of this deposit is, as you say, too imperfect to make it practically useful. In experimenting with it, however, twenty-five years ago, I found that the sulphate of copper and ammonia formed a solution which would deposit a perfectly adherent coat of copper on a freshly cleaned piece of iron. This is possibly the "alkaline solution" which you speak of as used by Messrs. Smith and Butler, though some of the double sulphate of copper and the fined alkalies would probably act better in the electrotype cell. The coating produced in this case is very thin but perfect, and I think available for many common uses. I meet iron in a variety of forms in the shops, superficially coppered, as I suppose, by this process. If a thicker coating is required it must be obtained through galvano-deposition.

The solution of sulphate of copper and ammonia is readily prepared by adding the agua ammonia of commerce to the common blue vitriol dissolved in water. A greenish precipitate is at first thrown down, which is readily re-dissolved by continuing to add the ammonia. If the addition of the ammonia is stopped just before all the green precipitate is re-dissolved, the solution will contain only the desired ammoniacal sulphate of copper. If more ammonia is added than is sufficient to re-dissolve the green precipitate, it may be requisite to heat the solution sufficiently to drive off the excess of ammonia. W. F. C.

Providence, R. I., Jan 14, 1866.

Natural Purification of the Schuylkill.

MESSRS. EDITORS:—Seeing in your valuable paper of January 7th, a communication signed "Fanny" in reference to the impurities contained in the Schuykill water, I thought I would state a fact, which would set at rest her anxiety regarding the sulphuric acid, and other compounds of sulphur which are discharged from the coal mines and mingled with the river water. About eight or nine miles above Reading, a stream called Maiden Creek, and two or three smaller streams not named, enter the Schuylkill and neutralize all the sulphur contained in it, by combination with the lime contained in the water of Maiden Creek, and the other streams, which, like it, have their source in a limestone formation. The sulphur of the Schuylkill unites with the line of the other streams, forming sulphate of lime, which falls to the bottom of the river in the form of white powder. So intense is this action that it gives the water a milky appearance for some distance below where they mingle together. When the water passes Reading, it is almost entirely free from sulphurous combinations, and is used for cooking and in steam boilers without injury either to persons drinking it, or to the iron of the boilers. Of all substances, I think iron is injured the most quickly by the action of sulphur. I was formerly a resident of Reading, and saw the place myself where the change takes place.

LEWIS GRISCOM.

Shenandoah City, Schuylkill Co., Pa., Jan 15, 1866.

Piston Motion and the Fly Wheel.

MESSRS. EDITORS:—In order to decide a very interesting argument, I would be pleased to have you answer through your valuable paper the questions following:—

Does the inner end of an engine piston stop as it goes back and forth? or, in other words, is there any time between its stopping, going in the one direction, and the starting, to go in the other or opposite direction? or is the motion continuous as if continuing in one direction or the taking of a circle? And also the following, if not asking too much of your time?

Is there any point at the center of the top of a wheel where it is neither going up nor going down, but a space across which the piston must move in a horizontal direction, before it has any further power on the wheel?

This first question should be applied to any other body moving back and forth in an opposite direction, as, for instance, the pendulum of a clock, etc.

J. B. F.

No. 25 Nassau street, New York, Jan. 12, 1866.

[To the first question, the answer is—the piston stops. All matter in motion in one direction must have that motion destroyed, and a new impulse given before it can move in an opposite direction; as a reciprocating steam piston does. Between these two motions the piston stops, an inappreciable but a certain period of time. The second question is confused. The part of the top of a wheel in motion which goes neither up nor down is *but* a point, this has nothing to do with the motion of the piston. The relative distances traveled by the piston and top of the wheel depend on the proportions of the same.—EDS.

Improvement in Ring Spinning.

MESSRS. EDITORS:—Some years ago, I made an alteration on the ring and traveler spinning frames run by us, which is very simple, but a very considerable advantage. Those frames have small clutches in the wheel on the spindle, and the bobbins are made with a groove in the bottom, in which are two small clutches to catch those on the wheel, and thus give motion to the bobbin. These very soon wear off. In place of using these small clutches, I substitute a leather washer on which the bottom rests, and when oiled, the leather will carry the bobbin around with it, and is superior in every way. I don't know of its being tried by any others, and if you think proper you may publish this suggestion for the benefit of other manufacturers.

H. W. MCELWEL.

Athens, Tenn., Jan. 8, 1866.

Photographic Collodion without Bromine.

MESSRS. EDITORS:—For the benefit of photographers—professional and amateur—who do not wish to use bromide in collodion, I am induced to give the following formula which I have used successfully for some years:—

Take of plain collodion, 6 oz., iodide of cadmium, 18 to 30 grains, iodide of ammonium, 12 to 20 grains; shake well, and let stand to dissolve and settle.

Then take plain collodion, 2 oz., and chloride of calcium, 20 to 30 grains; shake well, and let stand to dissolve and settle.

For use, add a small portion at a time of that containing the chloride to that containing the iodide, until the half tones are such as desired.

Any other soluble chloride may be used, as also other iodides.

I also take, say a couple of ounces of collodion already excited, and add a very small piece of phosphorus, about half the size of a pea; and of this two ounces, when the phosphorus is thoroughly dissolved, I add about from half to a drachm to the collodion I am using, which has a considerable effect in assisting reduction.

In using this formula the beauty of the result depends:—

First, Upon the materials of the collodion being good, and the collodion itself of the proper thickness.

Second, The iodides being of good quality, and the quantity in exact proportion to the thickness of the collodion, a thick requiring more and a thin less.

Third, A careful proportion of chloride to iodide, which must be determined by actual experiment.

Fourth, An equally careful addition of the collodion containing phosphorus, to that already excited, and being used.

Fifth, A proper regard to the time of exposure light, developing, etc.

I rarely strengthen with any thing except by a 20-grain silver solution, and redevelop with iron. I do not use my developer too strong, and it is very seldom I have to even sulphuret my negatives.

J. J. CLARKE.

No. 481 Canal street, New York.

Straightening Railroad Iron.

MESSRS. EDITORS:—I am obliged to you for the information contained in your letter of the 30th ult. I inclose an advertisement on the subject for insertion in your journal. About thirty-eight miles of our track were destroyed during the war. The crossties were piled in heaps, and the rails laid on them. As soon as the heaps were fired and the rails became heated, the ends bent down to the ground, and it is this iron which I desire to straighten. In straightening it with the appliances at present used here, slight curves are left in the rails, which are very perceptible upon trains passing over them, and are, of course, destructive to both track and rolling stock. Many railroads in the South are in a condition similar to our own, and if it is convenient for you to refer to the subject editorially, it will most likely direct the attention of ingenious men to the matter, and be of great service in the speedy reconstruction of our Southern lines of communication.

H. S. HAINES.

Engineer and Superintendent Charleston and Savannah Railroad Company.

Charleston, S. C., Jan. 6, 1866.

[The advertisement of Mr. Haines will be found in our advertising columns.—EDS.

An Apprentice Answered.

MESSRS. EDITORS:—I have some pity for your inquiring apprentice, so I send the following formula for oak graining:—

Take equal parts of raw and burned terra and senna, also about as much whiting finely ground in oil; then tone to a nice shade with raw and burnt umber. This must depend upon the tint desired and the color of the ground work. Also, break up finely a small piece of soap or beeswax, and mix thin for use, with equal parts of boiled and raw oil and turpentine.

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If your apprentice thirsteth after knowledge I would advise him to procure some primary work on chemistry, such as Draper's or Comstock's, and carefully apply himself, and he will soon understand the modes of white lead and zinc making. If he is poor, I would farther recommend him to use no liquor or tobacco, and spend the money for books.

A. W. ALLEN.

Yaphank, Suffolk Co., N. Y., Jan. 9, 1866.

[Our correspondent does not say what is to be done with the soap and oil.—EDS.

Suggestions.

MESSRS. EDITORS:—The very high price of alcohol makes it desirable that a substitute might be had for dissolving gum shellac which is used in varnishing patterns at founderies, and for various other purposes.

A writer in your paper states that shellac will dissolve in a saturated solution of borax, but the writer, on a trial, failed to secure such results.

Vulcanite or emery wheels come too high for general use. Can any of your readers suggest some cheaper mode of preparing emery wheels than those usually designated as vulcanite?

A Question of Cranks.

MESSRS. EDITORS:—A discussion has arisen between A and B, concerning the wheel and axle, which it has been decided shall be submitted to you for decision.

A says that the crank on the axle will exert more power by being bent than it would by being straight; though the power is applied at the same distance from the center of the axle. A says the crooked one will exert the most power, while B thinks that whatever the shape of the cranks may be, that on which the power is furthest from the center of the axle is the most powerful.

By answering this, you will much oblige both parties. A & B.

Franklin, Pa., January 15, 1866.

[B is right.—EDS.

Substitute for Pharaoh's Serpents.

MESSRS. EDITORS:—Seeing several articles in your valuable paper on the popular toy, viz: "Serpents' Eggs," being made by sulpho-cyanide of mercury, an article which is difficult to make and a hard matter to obtain in country towns or even cities, I would suggest a cheap and simple mode of making an article which forms an excellent substitute:—

Take 1 part of flour sulphur, 6 parts of cyanide of mercury; rub the sulphur in a mortar with the cyanide of mercury to a very fine powder (the finer the better), then make a cone of tin foil and pack the powder into it rather loosely, leaving sufficient room at its bottom to close it. If tin foil is not convenient, moisten the powder and form a cone of the same, as pastilles are formed, place in the sun or near a fire until sufficiently dry. M. J. LAUER.

Baltimore, Md., Jan. 8, 1866.

Sizes of Pulleys.

MESSRS. EDITORS:—Has a large pulley any more purchase than a small one, aside from friction? B.

[A large pulley has more power than a small one in proportion to the difference of diameter.—EDS.

Mount Chase, Jan. 8, 1866.

Water-wheel Challenge.

MESSRS. EDITORS:—I yesterday received a letter from Philadelphia, saying they would prepare any sort of a place we wished to test my wheels with Mr. Van De Water's. I wish Mr. V. to know this, as that was the reason he gave for not accepting my acceptance of his challenge. JAMES LEFFEL.

Springfield, Ohio, Jan. 15, 1866.

A NEW form of filter has been devised by the Apparateur of the College of France. It is made by placing in a tank of impure water a vessel so arranged that a sponge which it contains shall lap over its edge and dip into the water of the tank. The sponge gradually sucks up and purifies the water in the reservoir, and allows it to drop into the smaller vessel or receiver, from which it may be drawn off by a tube. By placing a few lumps of charcoal in the bottom of the receiver, filtration of the most perfect kind is effected.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Gearing for Grain-thrashing Machines.—The object of this invention is to obtain a simple means to compensate for the wear of the cylinder shaft and the bevel wheel shaft of thrashing machines. The cylinder shaft has a tendency to wear its bearings in a downward direction, while the bearings of the bevel wheel shaft wear upward, and the bevel gears on said shafts are consequently soon thrown out of line with each other, causing a great loss of power and much wear and tear. The invention consists in placing the bevel-wheel shaft in an adjustable frame, and so arranging the shaft in said frame that the gears may always be kept in line with each other and made to mesh properly. L. B. Hubbell, of Alton, Ill., is the inventor.

Window Shades.—This improvement relates to window shades of that class which are made of narrow woolen slats connected to each other at their edges by means of cords which are woven through or around them. Such shades are either rolled up from below when the window is to be exposed, or else they are raised from before the window by rotating the rollers from which they are suspended, and so winding the shades about such rollers. All such shades have these defects among others: their slats are more or less separated from each other, so that one can look into a room from without when the shades are down, and the sunlight is freely admitted through the crevices, thereby fading the carpet with which a room may be furnished; the slats are also liable to be injured by becoming engaged with objects that are brought near to them, also by becoming engaged and entangled with each other when they are wound up. This invention removes these defects, and it consists in cutting notches in the slats, so that when they are connected by the cords which are interwoven through or about them their edges will lap each other and an opaque shade will be produced which can be wound up and unwound with ease by means of a cord or other devices. Shades made according to this invention will have the appearance of blinds. Charles D. Blinn, of Port Huron, Mich., is the inventor.

Vulcanizing Flasks.—This invention consists first, in closing the flask by the pressure of the steam itself, so that the rubber is gradually heated and the flasks compressed automatically, and all danger of crushing the plaster mold of the teeth is avoided; second, in the arrangement of a packing ring and compressing flange, in combination with the boiler, clamp, and flask, in such a manner that by said flange the packing ring can be made to bear tight against the inner surface of the boiler and the escape of steam from the boiler can be prevented without difficulty; third, in the arrangement of inclined planes on the inner surface of the boiler, in combination with the clamp and flask, in such a manner that by inserting the flask into the boiler, and turning it round its cover is firmly depressed and held in position until the steam begins to act, and the final compression of the rubber in the flask is effected. Fourth, in the arrangement of segmental connections in the clamp, in combination with flat surfaces on the sides of the flask, so that said flask, together with the segmental connections, form a complete cylinder, which nearly fills up the boiler, and reduces the volume of steam, and the danger in case of explosion. A. B. Woodard, Alfred Centre, N. Y., is the inventor.

Horse Hay Fork.—This invention relates to a new and improved horse hay fork for elevating hay and storing it in mows in barns, and is applicable to that class of forks which have their heads connected by a hinge or joint to a long arm or handle. These forks are very simple, and are capable of being operated or manipulated with the greatest facility, so as to clear beams or other obstacles which may be in the path of their movement; but they have hitherto required the operator to hold the arm or handle with the guide rope, in order to prevent them from tilting and casually discharging their load under the gravity of the same. The object of this improvement is to avoid that difficulty, and to this end a brace is employed, connected with the arm or handle of the fork and the hoisting rope thereof, in such a manner that the fork will be retained in the position necessary to hold its load, and without in the least interfering with the discharge of the latter from the fork at the proper time. Richard W. Liscomb, Southfield, Pa., is the inventor.

Is the Cattle Plague Small-pox?

The London *Lancet* contains the following:—

"The report of Dr. Murchison's dissections of the diseased cattle, which appeared in the *Lancet* as long ago as August 26th, showed clearly that the rinderpest was not the pathological equivalent of human typhoid fever, and we believe we are correct in stating that this opinion has been confirmed by every subsequent observer. From Dr. Murchison's present communication, however, it is obvious that there exists a very strong analogy, if not absolute identity, between the rinderpest and small-pox. The arguments by which this view is supported, deserve serious consideration. It appears that in all cases of cattle plague there is an eruption on the skin, sometimes popular and postular, like that of variola; at other times consisting of flattened vesicles like those of cow-pox. The two diseases also resemble one another in their general symptoms and anatomical lesions, in their period of incubation and duration, and in their extreme contagiousness and capability of propagation by inoculation. There are even some grounds for believing that rinderpest may communicate cow-pox to the human subject, and the reason why this accident has not happened oftener may be due, as Dr. Murchison suggests, to the fact that most of the inhabitants of this country are protected by vaccination.

"It also appears that the physicians who so carefully described the cattle plague in the last century constantly alluded to the eruption, and compared it to that of small-pox. If the view now referred to be correct, it is impossible to over-estimate its importance. A remedy is at once placed in our hands for arresting the spread of the cattle plague, which has already come to be regarded as a great national calamity. We prevent the fatal form of small-pox in the human subject by inducing a mild form of the disease through vaccination. If rinderpest be a severe form of small-pox in cattle, why may it not also be prevented by inducing in cattle the mild form of the disease, or ordinary cow-pox? This we know can be done by inoculating them with vaccine lymph, or with the matter of human small-pox.

"No time ought to be lost in adopting Dr. Murchison's suggestion, to ascertain whether cattle, after such inoculations, be proof against the rinderpest. In the meantime valuable information might be obtained from members of our profession practicing in those parts of the country where ordinary cow-pox is known to prevail. Many remarkable instances have been recorded where individual cattle or entire herds have escaped in the midst of surrounding pestilence. Can it be shown this exemption has been due to their having suffered previously from the cow-pox? It seems, however, that the ordinary cow-pox has for some years been dying out in this country, so that it has been difficult to obtain fresh lymph direct from the cow, and thus the cattle of this country are probably less protected than formerly against the variola in a severe form. If this be so, there is no reason why vaccination should not be practiced as commonly among cattle as among men. The above investigations have been carried out in connection with the experimental inquiries instituted at the instance of the medical committee of the Cattle Plague Commission. Their former recommendation as to the arrest of traffic in cattle, is now being urgently pressed on the Government by the farmers at large; and if the views enunciated by Dr. Murchison should prove correct, the value of the service of the Royal Commission will be of the highest national importance."

ALMOST all the shoes made at Haverhill are made by steam, and every part of the business is carried on independent of the rest. One shop turns out heels and stiffenings, another uppers, in another sole leather is cut, and finally the goods are made up by steam power exclusively. A number of new establishments have been lately started, worked by steam power entirely.

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Improved Tube Expander.

In making tubular boilers, no part of the work gives more anxiety or requires so much care as fixing the tubes in their places. Since they serve two purposes—for stays and heating surface—being exposed to strains in different directions and to alternations in temperature, it will be apparent that all the work judiciously bestowed upon them is not thrown away.

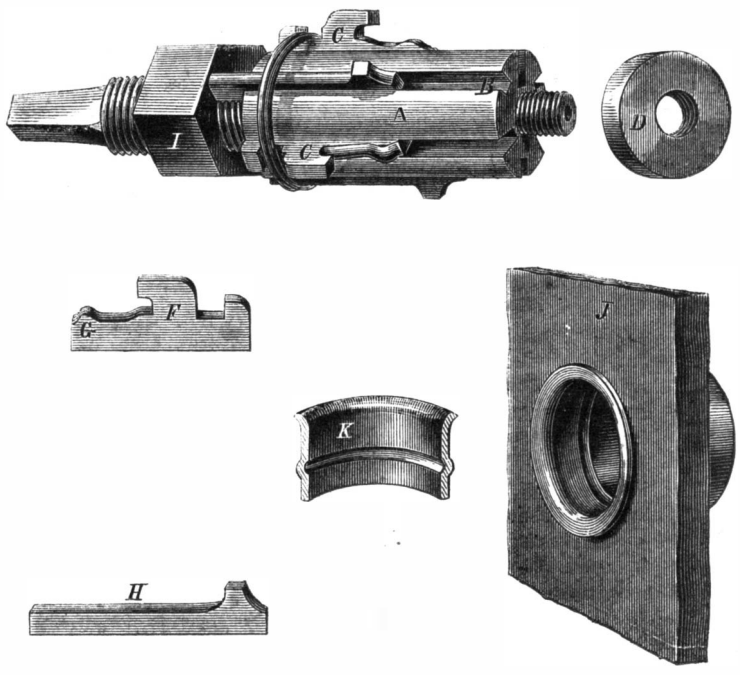
The common method of fastening the tubes is to pass them through the sheet, expand a collar or shoulder inside the same, where the water is, and and then turn the outer ends over in the smoxe-box and fire-box respectively, with the same tool. This work is done by percussion, or blows with a hammer, and many contend that it is an impertect and unsatisfactory method; in proof of which they point to frequent instances where the tubes have blown out, and leakages occurred of greater or less importance. It is also stated that the tubes are often cracked by the reckless use of the hammer.

The present invention does not contemplate the use of the hammer, the tube being fastened by drawing the end or pressing it, as will be shown hereafter. The details are as follows:—

The mandrel, A, has grooves, B, in it, which are inclined planes at the bottom. The tools, C, fit easily so as to slide in these grooves. The front end of the mandrel is provided with a circular nut, D, to prevent the tools from slipping out when not in use. The shoulder, E, inside of the tube is formed by the tool, F, the same having a bead, G, for the purpose. This tool also sets the tube out all round to the sheet, and makes it ready for the expansion tool, H. This tool is made of the right shape, with a shoulder on it, as shown in the engraving, and is used in the same way; that is, the mandrel is put in the tube with the beading tool, F, in it, and a ratchet wrench is then put over the square shank of the mandrel. This keeps the same in the tube at the proper distance from the sheet, and the nut, I, is then screwed down to the end of the tool so that it cannot recede. As the mandrel is turned by the ratchet wrench the tube is expanded, and by screwing up the brace of the wrench the tools are pushed out farther by the inclined planes of the mandrel, so that the shoulder is fully formed. A piece of the flue sheet is shown at J, with part of the tube in it. This engraving was taken from a full sized tube and sheet, and is a perfect representation of the superior quality of the work. A section of the tube is shown at K, which exhibits the depth of the shoulder.

It is claimed that this tool will set a tube tighter in the sheet than any other, and that it makes no difference in its operation whether the holes are round or not. In the samples of work sent the holes are one-sixteenth of an inch untrue, yet the work is very perfect. It answers equally well on large or small, on brass, iron, copper, or steel tubes, and is one of the best tools for the purpose ever made.

A patent was obtained through this office on Aug. 8, 1865, by Robert McConnell. For further information address him Box 401, Jacksonville, Ill. [See advertisement on another page.]



M'CONNELL'S TUBE EXPANDER.

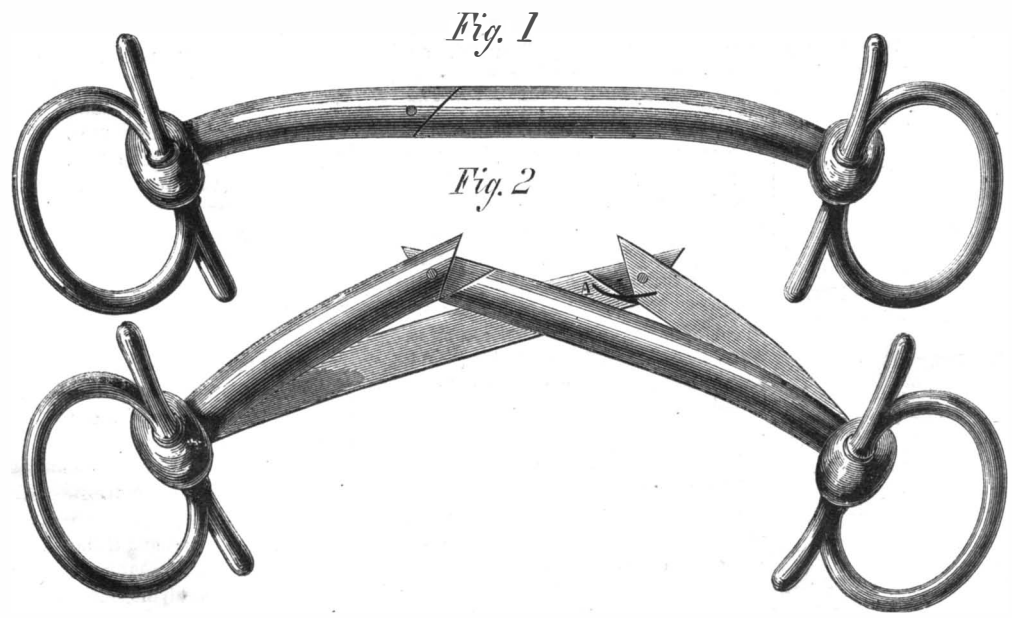
Improved Horse Bit.

Horses acquire vices, or are born with them, as readily as more accountable beings, and they ought to be broken of them as soon as possible.

The bit shown in these engravings represents a method of controlling unruly horses by putting them in such pain for the time that they are glad to forget their bad impulses and subside into tractable beasts again.

So long as the animal goes quietly, the bit remains in the ordinary form, as shown in Fig. 1, but any attempt to take it between the teeth and run away, as in rearing and plunging heavily, causes the bit to assume the shape shown in Fig. 2. Here the division in the middle separates by means of a spring between the two parts, and throws the two sections apart, pressing the sharp corners into the mouth and cramping the jaw very forcibly.

The inventor claims that this will subdue the most vicious beast, and will not harm him except on attempting to run away or otherwise misbehave. The whole patent is offered for sale at reasonable rates, as the inventor is not a manufacturer. No offers for less than one State considered. For further particulars address D. B. Baker, Rollersville, Sandusky Co., Ohio.



BAKER'S BIT FOR HORSES.

Illustrations for Patent Office Reports.

We have received from Messrs. E. R. Jewett & Co., of Buffalo, N. Y., advanced sheets of the illustrations for the Patent Office Reports for 1864. We have frequently alluded to these beautiful specimens of engravings and can only repeat what we have hitherto said, that they are all that could be desired, and are invaluable to these Reports.

FAIRLIE'S DOUBLE LOCOMOTIVE.

In relation to this engine, particulars of which we gave in our last number under the head of "An English Tank Engine," a foreign cotemporary says:—

"The load she had to draw was a heavy one, and she had some sharp curves to pass round, and some severe gradients to get over, the figure at one point being as much as 1 in 75. With her 350 tuns, however, behind her, she started off in a manner that was beyond all praise, and, with the exception of one pause, the result, we believe, of a little mismanagement, the trial was pronounced on all hands to not only have fulfilled, but to have exceeded, the anticipations which had been formed respecting it. The admirable qualities of the engine cannot be better illustrated than by the remark which a thoroughly practical man, the head of a large firm, subsequently made, to the fact that he did not believe that there was another locomotive engine in England which, upon her first trial, and on the same piece of rail, could have drawn more than two-thirds of the weight which the *Progress* carried behind her."

This is an exceedingly unreasonable statement for any "practical man" to make. This engine has two boilers and four cylinders, 15 inches by 22 inches each, acting on two pairs of drivers at opposite ends of the machine, and is, in fact, nothing but twin locomotives, having double the piston area and double the fire surface of an ordinary engine. Why it should draw more than a common engine is not strange, but why its capacity is only one-third more *is* strange.

Erratic Course of a Bullet.

"At a recent meeting," says the *Surgical Reporter*, "Dr. Sands showed a bullet removed from a soldier, who had been wounded in June, 1862, in the region of the upper right eye lid. The wound was perfectly healed, when he presented himself at the eye dispensary for some slight trouble experienced in the organ. He had been examined by surgeons in the army, but no bullet had been detected. On close examination, a swelling was discovered behind the ear, which, presenting the features of a hard foreign substance, was cut down upon, and proved to be an ordinary conical rifle projectile. The case was remarkable, as it showed how extensively these projectiles travel, without inflicting serious injury, through, or in the neighborhood of, important parts, or giving rise to much trouble."

"Observer" writing from Gold, Nevada, says the present iron armor for ships of war, is defective, being too stiff and unyielding, and as a consequence the plates and fastenings are broken. He suggests wire rope in place of it. The suggestion is old. Experiments tried at the Washington Navy Yard prove this armor to be one most easily destroyed.

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THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

VOL. XIV., No. 5..[NEW SERIES.]..*Twenty-first Year.*

NEW YORK, SATURDAY, JANUARY 27, 1866.

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Every man who has money to invest always desires to place it where it will make the best return. This being admitted, we undertake to say that $3, invested in the SCIENTIFIC AMERICAN, will return three-fold in the amount of valuable information which its columns supply. Mechanics, inventors, manufacturers, farmers—as well as every head of a family—will get, on an average, $10 worth of information from a year's number of this journal, and yet they can get it for the low sum of $2 50, in clubs of ten names.

Talk about high prices--here is something cheap enough to stop the mouths of all grumblers. Only think of it—a large volume of 832 pages, full of costly engravings, for $3, and less to clubs. If any of our readers think we can get rich at such prices, let them try the experiment. Send in your clubs and subscriptions.

THE GREAT PARIS EXHIBITION.

We are informed that upon application of our Government the time for receiving applications from this country has been extended to the first of March next.

Those who propose to exhibit will bear in mind, however, that they will have till January, 1867, to prepare their articles, as the Exhibition will not open until a year from next April.

Our Government is manifesting a deep interest in the Exhibition, and evinces a strong desire that our country should be honorably represented in this great congress of industry and skill, and we have no doubt that an appropriation will be made by the Government to defray all expenses attending the shipment and proper display of the articles to be sent.

About three hundred applications for space have already been made by our countrymen, and the list embraces some of our best-known manufacturers and inventors.

We have no doubt that great care will be exercised by a competent committee that none other than meritorious articles be admitted. With the experience of the past before us, and having ample time for the arrangement of all details, there is no reason why we should not make a display such as shall do credit to our skill and ingenuity.

All applications for space should be made to J. C. Derby, No. 40 Park Row, New York.

THE CIRCUIT OF CARBON THROUGH ANIMAL AND VEGETABLE LIFE.

Among those operations of nature which may be contemplated from new points of view with ever-renewed interest, is the circuit which carbon is perpetually running through animal and vegetable organisms. Upon the continuance of this circuit depends the existence of all life upon our globe. If it were suspended, all animals would cease to breathe, and all vegetables to grow; the sea would become a lifeless waste of waters, and the earth an uninhabited desert, with no leaf or flower, or living thing upon its plains or mountains.

Here is a piece of charcoal that was very recently an essential portion of a growing oak tree. If we set it on fire and expose it to a current of air, its color changes from black to red, and it slowly vanishes from our sight—vanishes, not by some trick of legerdemain, but by actually becoming invisible. The miracle would excite our wonder but for the fact that we have seen it peformed so many times before.

To the imperfect observation of the unaided senses, it seems plain that the charcoal is annihilated; but the power of modern science can follow it in its invisible flight, and can ascertain positively that every ounce and grain of its substance is still in existence, and that it weighs precisely as much now as it did when in a solid mass, before undergoing its miraculous transformation.

The simple explanation of the disappearance is that the charcoal in burning combined with the oygen of the atmosphere—that the two elements, thus combined, constituted carbonic acid—and that carbonic acid at ordinary temperatures is a colorless gas. The charcoal in its combination with oxygen has been changed from the solid to the gaseous state, and has, by this change, become transparent and invisible.

The same combination of carbon and oxygen is always going on in the interior of our bodies, a given quantity of carbon generating, in this case, the same amount of heat—though not of the same intensity—as when charcoal is burned in a fire. It is in this way that the body is kept warm, and the vital functions are kept in operation. The lungs are made up of numerous minute cells of extremely thin membrane, on one side of which delicate blood vessels are distributed, while the air comes in contact with the other side. This membrane has the property of absorbing oxygen from the air, and of passing it through by endosmosis into the blood. The blood, thus supplied with oxygen, returns to the heart, and is forced through the arteries all over the system. The digested food, being also poured into the blood, is brought in contact with the oxygen, when the carbon of the food combines with oxygen, forming carbonic acid, and generating heat. On the return of the blood to the lungs, the carbonic acid passes outward through the membrane by exosmosis, and is expelled through the nostrils into the atmosphere.

This carbonic acid floats in the atmosphere until it comes in contact with a growing leaf, when it is instantly absorbed, and under the combined action of light and vegetable life it is decomposed, the carbon is carried inward to help build up the structure of the plant, or to aid in the formation of fruit and grain, to be again used for food; while the oxygen is set free in the atmosphere to be again breathed by some animal, again combined with carbon to keep up the slow fire of animal life, and again restored to the atmosphere.

Thus carbon runs its perpetual circuit from the animal to the vegetable world, and from the vegetable back to the animal—keeping up, in its course, both forms of organic life.

GEOLOGY OF THE CENTRAL RAILROAD WATERS.

At the last meeting of the Polytechnic Association, extracts were read from Professor Chandler's report to the officers of the Central Railroad, on boiler incrustations, when Dr. Stevens remarked that this report is interesting to geologists as well as to engineers, for it is the most thorough examination of the waters of that district that has ever been made. The examination was confined to the line of the road between Syracuse and Rochester, and in this portion the road runs very nearly along the line of the canal. Throughout the whole distance the formation is the Onondaga salt group—the rock from which our salt is obtained—and this is the only formation in the State that contains sulphate of lime.

The waters examined by Professor Chandler are derived from three sources—from the Onondaga salt rocks, from surface ponds and brooks, and from streams flowing northward which have their source in the Devonian and Carboniferous formations. By examining any one of these analyses it is easy to tell from which of the three sources the water was derived. Those from the salt rocks contain a large proportion of mineral impurities, especially sulphate of lime and chloride of sodium; those from the southern streams bear traces of the various rocks which they have traversed; while the surface waters are comparatively pure.

Dr. Stevens further stated that the officers of the Central Railroad are so well pleased with Professor Chandler's labors that they have determined to have all the feed waters throughout the line of their road examined by him. This will be the most complete examination that has ever been made of the waters of so large a district in any country.

THE SMOKE OF THE RIVER.

"It is a terribly cold morning. We have never had any thing like it before in New York. I have kept a thermometer for thirty years, and till this morning I never saw it more than one or two degrees below zero; this morning it was ten below. As I came over in the ferry-boat the steam was going up from the East River as if the water was boiling. By the way, I want to know what makes that steam vanish so quickly; what becomes of it?"

These remarks were made to us by a Brooklyn gentleman, and in reply we asked him—

"Did you see the glass engine that was exhibited in Brooklyn by the glass blowers?"

"Yes."

"You noticed that the steam was perfectly invisible?"

"Yes."

"When you see steam blowing out of a pipe, if you observe closely, you will find that very near the pipe there is nothing to be seen; it is only after the jet gets an inch or so from the pipe that it becomes visible. In fact, it is only after the fluid has been condensed from steam to water that we are able to see it. The white cloud that we see is made up of numerous globules of water—very minute, indeed, but still liquid globules, which reflect the light from their surfaces. Steam is a gas that allows the light to pass through it in straight lines, and it is consequently transparent and invisible.

"In these cold mornings, as a portion of the water rises in vapor, it is immediately condensed in little globules, forming the white cloud that we see, and then it may disappear in two ways—the several globules may be so scattered that they cease to be visible, or the water may be absorbed by the atmosphere, and thus changed again to the form of vapor. Cold as the air was here, it was coming down to us from Lake Superior where it had been colder still, and it was in process of being warmed. With the rise in its temperature its capacity for moisture was being increased, and it was thus in a condition to absorb an additional quantity of watery vapor. We presume the disappearance was the result mainly of absorption."

Gigantic Scheme for Supplying London with Water.

Mr. Bateman, the engineer of the Glasgow waterworks, has published a pamphlet proposing a scheme for supplying London with water by means of an aqueduct from North Wales. He proposes that the aqueduct shall have two branches in Wales, which shall meet before they cross the Severn; the length of the whole will be 152 miles; the capacity will be 220,000,000 gallons daily, and the cost £8,600,000—upwards of $40,000,000.

MACHINE FOR TURNING HUBS.—Manufacturers o the above machines will do well to advertise in the SCIENTIFIC AMERICAN, as we have inquiries from readers.

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AUSTRIAN INDUSTRIAL EXHIBITION.

The Austrian Imperial Agricultural Society, under the patronage of the Archduke Charles Ludwig, proposes opening, at Vienna, in the month of May, of this year, an exhibition of agricultural products of the empire; also, of machinery and implements for agricultural purposes from all parts of the world. We call the attention of American manufacturers to this exhibition, as the great and daily-increasing demand for agricultural machines in Austria would, doubtless, open to them a valuable market for their products. In 1857, a similar exhibition took place in Vienna, in which English machines were largely represented. The consequence was, that England has, since then, enjoyed almost a monopoly of the Austrian market for such machines.

Considering the superiority of construction, as regards solidity and simplicity, of the American agricultural machines, we do not doubt that the manufacturers of this country would derive great benefit by sending samples to the exhibition at Vienna.

The Austrian Committee is in correspondence with Messrs. Austin, Baldwin & Co., who will, therefore, be able to furnish all information that may be desired. The Austrian Legation, in Washington, and the Consul-General, in New York, are also in posession of all the particulars of the programme. It is, therefore, very desirable that immediate application should be made to Messrs. Austin, Baldwin & Co., 72 Broadway, New York, by those who anticipate availing themselves of the inducements offered by this exhibition, that the committee at Vienna who will take charge of American contributions may have time to make their arrangements accordingly.

COMFORTABLE SKATING.

A great drawback to the pleasure of skating are the cold noses and toes, which must be endured in participating in this sport upon ice. Mr. J. L. Plympton has, after devoting years and a vast expenditure of money, overcome all the discomfort usually attending skating, by inventing a roller skate so constructed that all the intricate movements made by an expert skater upon ice may be accomplished upon a smooth floor, and, to a considerable extent, upon a carpeted parlor. At Mr. Plympton's rooms No. 145 Tenth street, near Fourth avenue, we have seen some of the most dexterous movements we have ever witnessed upon ice, performed on his flexible roller skates, by himself and others, in a warm, well-lighted hall, which he has fitted up very neatly for the amusement and exercise of his own family and friends.

Skating, in a well-lighted, comfortable room, with one's friends sitting around admiring the grace and skill exhibited by the skater, is quite another thing from going miles on a cold night to reach a pond of ice, and then almost freeze while engaged in the sport, if lucky enough to find the ice in a condition for use. In using Mr. Plympton's patent skate, one season is the same as another, and they never require resharpening.

Mr. Plympton is very modest about bringing his invention before the public, but we have been acquainted with its merits for some time, and we know whereof we speak when we say it is the *ne plus ultra* among parlor skates.

Mrs. Z. R. Plumb gave an exhibition of her youngest class in physical exercise, at her Academy, No. 59 West Fourteenth street, last Monday afternoon, Jan. 15th. The little ones went through their various drills to the evident admiration of their parents.

Mrs. Plumb's system of drilling and exercise is not only exceedingly beneficial in imparting healthful vigor and strength to the muscles, but her pupils seem to attain a grace of motion not unlike that acquired of the dancing master. Her exercises are all timed by music, and are quite fascinating and beneficial to both adults and children.

Atmospheric air, on being condensed thirty times, has its capacity for heat reduced to one-half, and if suddenly compressed to twenty times its ordinary density, will disengage heat enough to show an elevation of temperature eqnal to 900 degrees Fah.

PROF. BLOT'S COOKING ACADEMY.

Among the great variety of business carried on in New York City one of the last established is an institution for teaching the art of cooking.

Prof. Blot, author of "What to Eat and How to Cook It," has established an Academy for teaching the art of cooking at No. 896 Broadway, near 20th street. He has daily classes for cooks, and others for ladies who wish to acquire a knowledge of the art of cooking. He introduces a new bill of fare, complete, from soup to dessert, which he not only explains the mode of making, but produces before his learners—having all the facilities at hand for boiling, roasting, baking, stewing, broiling, etc. His institution is becoming very popular among the ladies of this metropolis, and it promises to be a successful enterprise in every sense.

SPECIAL NOTICES.

Samuel T. Thomas, of Laconia, N. H., and Eliza A. Adams, administratrix of the estate of Edward Everett, of Townsend, Mass., have petitioned for the extension of a patent granted to the said Edward Everett on the 16th day of March, 1852, for an improvement in pattern cards for Jacquard looms.

Parties wishing to oppose the above extension must appear and show cause on the 26th day of February next, at 12 o'clock, M., when the petition will be heard.

Daniel Shaw, of Elkhart, Ind., has petitioned for the extension of a patent granted to him on the 6th day of April, 1852, and reissued on the 3d day of November, 1863, for an improvement in smut mill and grain separator.

Parties wishing to oppose the above extension must appear and show cause on the 19th day of March next, at 12 o'clock, M., when the petition will be heard.

William Baker, of Utica, N. Y., has petitioned for the extension of a patent granted to him on the 13th day of April, 1852, for an improvement in hinges.

Parties wishing to oppose the above extension must appear and show cause on the 26th day of March next, at 12 o'clock, M., when the petition will be heard.

Joel Whitney, of Winchester, Mass., has petitioned for the extension of a patent granted to him on the 13th day of April, 1852, for an improvement in feed apparatus for planing machines.

Parties wishing to oppose the above extension must appear and show cause on the 26th day of March, next, at 12 o'clock, M., when the petition will be heard.

Charles T. Grilley, of New Haven, Conn., has petitioned for the extension of a patent granted to him on the 20th day of April, 1852, for an improvement in capping screws.

Parties wishing to oppose the above extension must appear and show cause on the 2d day of April next, at 12 o'clock, M., when the petition will be heard.

PATENT-OFFICE DECISIONS.

Interference between the respective applications of C. P., C. M., E. R., J. B., and A. B., for patents for a mode of increasing the flow of oil from oil wells.

The Board, by Elisha Foote :—The process for which these patents are claimed consist in exploding a heavy charge of powder at the bottom of oil wells. The great hight of the column of water above the charge prevents its action upward, and the gases consequently enter the seams and crevices of the rock and open passages to the hidden fountains of oil. The idea seems to have occurred to several different persons at about or nearly the same time, and the somewhat difficult question arises as to whom the patent for it belongs.

The construction of cartridges to be exploded at great depths under water, and the mode of firing them by means of electricity and by percussion, present nothing new, and the effects upon the rocks of explosions under deep waters are well known. Blasting under such circumstances and by the same means has long been practiced.

The inquiry is not, therefore, which of the several parties in this case first devised the torpedoes and other means used to produce the explosion, for in that all of them have been anticipated, and none would be entitled to a patent. What, then, is there novel for which a patent may be claimed? It is the discovery of effects resulting from such explosions—that thereby wells may be made productive from which no oil had previously been obtained, and that the flow in others might be thereby renewed which before had been exhausted.

Our laws give a patent to one who has discovered, as well as to one who has invented, any new and useful art. But there is a manifest difference between the two in respect to the application of such laws. An invention is an operation of the mind. It may be completed, described, or illustrated without a trial. But a discovery can be made only by experiment or observation. It must be made manifest to the senses. Theories and conjectures lead to experiments, but not until the trial is made can it be said that the truth is made known. Many conjectured before Franklin that lightning was electricity, but the discovery was not made until the kite was raised and the spark was obtained. The effects of vaccination were not known until the trial. Previously there were conjectures, theories, plausible speculations, but no discovery. In inventions the inquiry sometimes arises, who first conceived the idea—for that may be an invention. But in discoveries, the inquiry is less important, for the idea is but a conjecture. The successful experiment is the discovery.

Of all the parties to this interference, E. R. is the only one who carried his ideas into practical results. He had six torpedoes constructed, and in January last took them to Titusville, exploded them in wells, and found out the results and the value of the process.

It is probable that C. P. was before him in the conception of the idea. As early as January, 1861, he explained to a witness his views and plans upon the subject, and from time to time since he has made drawings of the apparatus and urged upon others the probable success of the process. But he does not seem to have done anything to test the correctness of his views, and they would perhaps have remained forever but theories and speculations had it not been for the labors of E. R.

A. B. came very near being the first discoverer. He made a journey from Rochester to Titusville in September, 1863, for the express purpose of testing the process. But he was taken sick on his arrival and obliged to return without effecting anything. And again in August, 1864, he employed a person to go to Titusville and prosecute the inquiry. But it does not appear that any successful result was obtained by him.

Both J. B. and C. M. were subsequent to other parties in the conception of the idea, and neither of them attempted to put it in practice.

The importance we attach to the first successful experiment renders it unnecessary for us to inquire more particularly into the priority of conceptions. It is probable that the idea has recurred to many persons that some beneficial results might be obtained by such subterranean explosions. But it was a conjecture merely. No one could tell without experiment what the effect would be, whether good or bad, or indeed whether there would be any action upon the flow of oil. The whole subject of these strange and unaccountable deposits is a mystery, and all the knowledge we have in regard to them has been obtained by experiment. Speculations of the closet, however valuable, are not the subjects of patents. But he who has expended his time and money in experiments, who has produced practical results, and created pecuniary values, he it is that is entitled to the reward.

We concur with the Examiner in awarding the patent to E. R., and accordingly affirm his decision.

Washington, January, 1866.

CORDING INSTRUMENT.

Appeal No. 1,793.—Application of John N. Wilkins for a patent for Improved Cording Instrument.

S. C. Fessenden for the Board.—A patent is claimed for this instrument as a new article of manufacture—the Hand-Cord Guide, herein described—the same consisting of a handle, rod, and tube, adapted for the purposes explained.

The novelty in this invention, it is alleged, consists in making a cording guide, which is adapted for use by the hands, instead of having to be fixed in a sewing machine, and controlled thereby. The Examiner rejects this claim for invention as having been anticipated—citing, as references, Rankin's, Taylor's, Benedict's, and Kollman's patent.

On examining these patents, it appears that they severally deliver the cords through a short tube at the point, so as to admit of turning sharp angles, and each is susceptible of being used as a hand implement, detached from the machine, and each has guides for the thread in or near the part, which, in such case, would serve as a handle. As these cording guides can be used as a hand instrument, disconnected from the machines, we do not find that Wilkin's claim presents, in its main feature, any patentable invention; nor does it offer, in any of its features, so far as we can perceive, what has not been substantially anticipated in the references adduced.

Washington, December 29, 1865.

The Best in the World.—The N. Y. *Business Mirror* published in this city says:—

The Scientific American completed its twentieth year with the number for Dec. 23, and enters upon the new year with all its excellent features retained, and with renewed efforts to maintain the high position of usefulness which it has always occupied. It is hardly necessary for us to say that it is the leading scientific paper in this country or in the world; the fact is pretty generally understood.

By an explosion of fire damp in an English colliery, recently, thirty persons were killed outright, and many more injured. After the accident four safety lamps were found unlocked, and in the pockets of some of the men were matches, pipes and tobacco, etc., all of which were contraband in mining operations.

The cost of the silver plates of the batteries constructed for the old Atlantic telegraph reached £2,520. A set of graphite plates, equal in number and size, were substituted for £210 at the suggestion of Mr. Walker

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ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JANUARY 16, 1865.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

52,010.—Aqueduct Coupling.—John Aldrich, Lake Village, N. H.:

I claim a log or other wooden pipe, coupling made of cast metal, with thin or sharp ends and a central outwardly projecting ring or flange, B, substantially as and for the purpose herein specified.

52,011.—Cattle Pump.—John B. Atwater, Chicago, Ill.:

First, I claim arranging a stock-pumping apparatus and also a drinking trough within a yard or inclosure, in such manner that the animals, upon entering or leaving such inclosure, will operate the pump and supply the trough with water, substantially as described.

Second, The pumping lever, A, having platforms, C C, applied to one arm, and a weight applied directly to the other arm, substantially as described.

52,012.—Dentistry.—William Ballard, New York City:

I claim, in the plates of artificial teeth, making grooves, A, around the central part of the plates, and also transverse grooves, A', near the heel of the plates, for the purpose of making such plates adhere more easily to the mouth, substantially as described.

[The object of this invention is the construction of plates for artificial teeth, in such a manner that they will be more securely and certainly retained in their places in the mouth.]

52,013.—Skate.—E. H. Barney, Springfield, Mass.:

First, I claim the bracket, A, when constructed and used substantially in the manner and for the purpose herein described.

Second, The method of raising the front end of the toe plate, B, by means of the brackets, A A', substantially in the manner set forth.

52,014.—Specula for Uterine Diseases.—Ezekiel M. Bartlett, Louisiana, Mo.:

First, I claim a series of valves, a, so hinged to the outer band or collar, A, that they may be contracted and expanded at pleasure, all acting together, or any number of them turned over, and the remainder only used.

Second, I claim the bands or collars, A and B, hinged together as represented, and operated by the set screws, b, so as either to allow the contraction of the valves or to gently expand them to any required extent at pleasure.

Third, I claim the combination of the plunger valves, bands, or collars, hinges, and set screws, for the purposes intended, and operating as set forth.

52,015.—Shoes and Dies for Grinding and Amalgamating Machines.—F. G. Belknap, Washoe, Nevada:

I claim constructing and placing the shoes and dies upon upper and nether disks, obliquely at about the angle as described, together with the beveled bars, B B B, etc., substantially as described and for the purposes set forth.

52,016.—Bow Irons for Carriages.—H. M. Bidwell, New Haven, Conn.:

I claim the bow iron constructed substantially in the manner as herein set forth.

52,017.—Spike Extractor.—Major E. Bishop, Southboro, Mass.:

I claim the combination and arrangement of two or more bearers, B C, of different lengths with the clawed bar, A, the whole being applied together and so as to operate in manner as set forth.

I also claim the combination and arrangement of the stop, D, with the bearer, C, and the clawed bar, A.

I also claim the combination and arrangement of the spring catch, E, with the bearer, C, and the clawed bar, as described.

I also claim the combination of the retainer, F, and its screw, G or the equivalent thereof, with the bar, A, and one or more bearers, B C, applied to such bar, as specified.

52,018.—Window Shade.—Charles D. Blinn, Port Huron, Mich.:

I claim a window shade made of slats connected to each other, edge to edge, by means of cords woven through and about them, notching the edges of the slats where the cords cross them so as to compel the slats to lap each other and make an opaque shade, substantially as described.

52,019.—Pump for Deep Wells.—Jos. A. Bloom, Philadelphia, Pa.:

First, I claim the construction and arrangement of the hydraulic and pneumatic pump chambers, I and H, in one cylinder, by means of the division plate, B, affording a steady guide to both pistons, E and E, in combination with the air-conducting pipe, F, and well tubing, D, as shown, and substantially as described, together with system of valves.

Second, The construction and arrangement of the hollow metal chamber, w, on top of the bottom piece, O, inclosing, hermetically, a wire coil, connected with any galvanic apparatus on the surface, for the purpose and substantially as described.

52,020.—Sofa Bedstead.—Frederick Boeger, Philadelphia, Pa.:

I claim the extensible platform with its adjustable hinged head and foot frames, C C, when constructed and arranged to operate in combination with a sofa frame, A B, having a fixed back and ends, and a fixed platform, a', substantially as and for the purposes described.

52,021.—Water Wheel.—Nelson Bowker, New York City:

I claim the bucket boards, B, in combination with the levers, J I.

I also claim supplying the chambers in the wheel and breast with heat, substantially as and for the purpose described.

52,022.—Sugar Evaporator.—Abram L. Brink, Warren, Ill.:

I claim the combination of the central and side compartments, C D D, with the corresponding central and side flues, A B B, arranged substantially in the manner and for the purposes set forth.

I also claim the extension of the compartment, C, beyond the sides of the central flue and over the hollow partitions, H H, substantially as and for the purposes described.

I also claim, in combination with a furnace, consisting of the central flue, A, and side flues, B B, the transverse supporting rockers, F, as a means of strengthening and sustaining the side divisions of the apparatus and readily adjusting the level of the pan, substantially as set forth.

I also claim the hollow supporting partitions, H H, between the central and side flues, in combination with the central compartment, C, constructed and arranged as set forth.

52,023.—Vessel for Petroleum.—Joseph Brakeley, Philadelphia, Pa.:

First, I claim a barrel or other vessel, in the solid wood composing which passages are formed, substantially as and for the purpose herein set forth.

Second, In combination with the above, I claim the use of an hydroscopic agent, substantially in the manner and for the purpose specified.

52,024.—Oscillating Engine.—Felix Brown, New York City:

First, I claim the arrangement of a flat seat on an oscillating cylinder to operate in connection with a flat open side valve, substantially as set forth

Second, The rocking fork, h, and links, k, in combination with the valve, g, and oscillating cylinder, A, constructed and operating substantially as and for the purpose described.

Third, The spring bar, j, in combination with the fork, h, valve, g, and oscillating cylinder, A, constructed and operating substantially as and for the purpose set forth.

Fourth, the rollers, c, and traveling plates, e, in combination with the trunnions of an oscillating cylinder, constructed and operating substantially as and for the purpose described.

[An engraving and description of this invention was published on pages 255 and 256, Vol. XIII., SCIENTIFIC AMERICAN.]

52,025.—Suspended.

52,026.—Harvester.—Caleb Cadwell, Waukegan, Ill.:

First, I claim the raking devices consisting of the branching chain, O', and the fingers or hooks, N, in combination with the platform, H, formed with the grooves, h, and otherwise constructed as herein described.

Second, I claim, in combination with the chain, O', and fingers or hooks, N, the lever, S, connecting rod, V, links, V' V', and crank, W, arranged and employed substantially as and for the purpose specified.

Third, I claim, in combination with the above parts, the clutches, X X', claw, Y, lever, Z, link, a, and foot bar, b, arranged and operating substantially as herein described.

Fourth, I claim the pivoted plate, e e2, and flange, e', in combination with the finger or hook, N, for the purpose explained.

Fifth, I claim the arrangement of standards and braces, herein shown and described, for supporting the reel.

Sixth, I claim elevating the grain platform by means of the frame, B, bail, g, and lever, j, when the parts are arranged as herein shown and described.

Seventh, I claim the platform, H, constructed with top and bottom plates, the hinged side and end pieces, and the angle brace, substantially as described.

Eighth, I claim the wheel or series of rollers, d, when constructed, arranged, and operating as herein described.

52,027.—Harvester.—Caleb Cadwell, Waukegan, Ill.:

First, I claim the combination of the yielding bearing of the pitman rod, J, with the spring, K', and screw, K, all constructed and arranged to operate in the manner and for the purpose herein described.

Second, I claim the arrangement of the wheel, F, with the groove, f, in combination with the vibrating lever, H, and thimble, h4, substantially as described.

Third, I claim the cog wheel, formed with two sets of cogs, C' C', to adapt it to impart different degrees of speed to the pinion, D, and cutter bar, as described.

52,028.—Railroad Snow Plow.—Jacob C. Carncross, Philadelphia, Pa.:

First, I claim combining the plows, E N, with the axles, D D', by means of the swinging frames, F, substantially in the manner and for the purpose described.

Second, I claim the combination and arrangement of the springs, I, and rods or chains, J, with the plows, E N, and truck, A, substantially in the manner and for the purpose above set forth.

Third, I claim the combination of the shoes, L, with the plows, E N, substantially as and for the purpose above set forth.

Fourth, I claim the combination of the wings, M, with the plows, E N, substantially as described and for the purpose specified.

Fifth, I claim constructing the plow, N, with the scoop, O, substantially in the manner described and for the purpose set forth.

52,029.—Axle Box.—James Christy, Philadelphia, Pa.:

First, I claim the stop or projection, d, fitting into an opening in the top of the box, and arranged in respect to the key, E, substantially as and for the purpose herein set forth.

Second, I claim the combination of the lid, F, fitted to the front of the box, and combined with the projection or stop, d, substantially as described.

Third, I claim the combination of the lid, F, spring catch, G, and projection, e, on the box.

52,030.—Washing Machine.—N. B. Clabaugh, Frederick, Md.:

First, I claim the combination of a series of corrugated segmental slats, c c c, with an oscillating rubber, which is arranged to work within a concave, G, which is composed of a series of eccentrically curved and corrugated slats, substantially as described.

Second, I claim the combination of an oscillating rubber, which is supported by means of pivoted arms, B B, with the loaded levers, C C, substantially as described.

52,031.—Lamp.—Isaac Clark, Brooklyn, N. Y.:

I claim the movable flaps, f f, lugs, a a, and gear wheels, d d, operated by crank, G, for the purposes and uses substantially set forth in specification.

52,032.—Medical Compound.—Samuel P. Clayton, South Amboy, N. J.:

I claim the composition above described, compounded of the ingredients mentioned, or of their known equivalents, substantially as and for the purpose herein set forth.

[This invention consists in a new and useful composition of matter for preventing and curing the disorder or habit of sweating feet.]

52,033.—Coal Stove.—J. D. Conner, Bloomington, Ill.:

I claim the combination of the mixing chamber, I J, consisting of two concentric domes, the inner perforated diaphragm, P, double flange, N, and shells, A1 A2, all constructed and arranged as and for the purpose set forth.

52,034.—Fly Trap.—E. N. Cummings, Colebrook, N. H.:

I claim the arrangement and combination of the stopping brush, e, with the opening, b, the entrapping box, C, the disk and its radial ribs, arranged as set forth.

I also claim the above-described arrangement or application of the partitions, d, and gate or valve, c, with the opening leading into the entrapping box and with the rotary disk, provided with radial ribs, as specified.

52,035.—Washing Machine.—Harrison Doolittle, East Cleveland, Ohio:

First, I claim the arrangement of the open removable reel, J, removable arbor, C, adjustable stud shaft, E, and removable and adjustable pressure roller, N.

Second, The arrangement of checks, H H', and gaskets, G G', for the prevention of leakage around the arbor and stud shaft, E.

52,036.—Apparatus for Making Scroll Biscuit.—Adam Exton, Trenton, N. J.:

First, I claim the former above described, for preparing scroll biscuit for the oven, constructed with grooves separated from each other by ridges or raised spaces, and operated substantially as set forth,

Second, I also claim making a series of marks or depressions across the tops of the ridges, at right angles with them, and at such distances as shall equal the length of the divisions of the biscuit, substantially as and for the purpose above set forth.

[The object of this invention is to facilitate the making of scroll biscuit. It consists in the construction and use of a former, made of wood or other suitable material, the face or upper surface of which is grooved to receive rolls of biscuit, the grooves being separated one from the other by ridges which are left between them.]

52,037.—Cotton Gin.—Charles Louis Fleischman, New York City:

I claim separating fibers of cotton from the seeds by means of a series of hooks arranged on a bar both ends of which describe circles or parts of circles, or equivalent curved paths, in combination with bars, or the equivalent thereof, to form a space between which the hooks are made to rise to get hold of the fibers, and then to descend to strip the fibers from the seeds, substantially as described; and also I claim, in combination with the hooks having a mode of operation substantially as described, brushes or their equivalents, for stripping the fibers from the hooks as they rise to get a fresh supply of fibers, substantially as described.

52,038.—Steam Trap.—Horace N. Foster, East Greenwich, R. I.:

First, I claim the combination of the two springs, g and c, with the valve, and cross piece, o, substantially as described and arranged and for the purposes set forth.

Second, I claim the lever, D, having a slot, as set forth, in combination with the rods, C and s s, arranged substantially as described and for the purpose set forth.

52,039.—Sawing Machine.—John A. Geer, Hadlyme Conn. Antedated Jan. 10, 1866.

First, I claim the combination of the adjustable pivoted frame or bars, S, socket, U, slide, V, and clamp or dog, T, arranged and operating in the manner described, and employed to feed the stuff to the saws, H H, in the arc of a circle, and for the purpose explained.

Second, I claim the arrangement of the arms, e f, in connection with the gearing, b c d g, and shafts, J L, substantially as and for the purposes specified.

[This invention relates to a new and improved sawing machine, designed for sawing curved work, such as fellies, wheels, and other articles which are in the form of portions of circles. The object of the invention is to obtain a simple device for the purpose specified, and one which will operate with but little friction, and will admit of being manipulated or worked by an attendant with the greatest facility.]

52,040.—Composition for Coating Amalgamating Pans, Etc.—Charles H. Golding, Virginia, Nevada:

I claim mixing the above-named ingredients in about the proportion stated, and subjecting the same to heat, to form a new and useful composition of matter for various purposes.

52,041.—Billiard Indicator.—Mayer Gootmann, New York City:

I claim the arrangement of the registering balls, D and E, upon circular or arched slides or rods, whose lower ends are fastened in the lower part of the frame, in combination with the loose rings, v v', and r r', situated at the ends of said slides or rods, n and m, and acting upon or connected with leaves, G and H, of a registering apparatus respectively, in the manner and for the purpose substantially as described.

52,042.—Bit Holders for Braces.—J. Parker Gordon, West Garland, Me.:

I claim a bit holder for a brace, consisting of the sliding winged clutch, B, nut, D, working on the horizontal screw thread, a, when arranged to hold the bit in socket, A, substantially in the manner described.

[This invention consists in the employment of a clutch of novel construction, fitted to slide on the arm of the brace, and so arranged that one of its wings will press into a suitable notch or recess made in the edge of the bit, for the purpose of holding the said bit firmly in its socket.]

52,043.—Passenger Register.—Ephraim Hambujer, New York City:

I claim the apron or strip, I, extending over drums, H A J, in combination with the vertical arbor, B, and radiating arms, D, constructed and operating substantially as and for the purpose set forth.

52,044.—Machine for Polishing Wood.—Frank Hoffman, West Cambridge, Mass.:

I claim the combination as well as the arrangement of the supporting bar, F, and the mechanism (that is the rods, H H, and cranked wheels, c c, for moving the said bar, and the plane stock over the bed, with the plane stock, K, and the weighted box, R, the two bars, P Q, their cords, e e h h, and the sustaining pulleys thereof, the whole being substantially as and for the purpose or purposes as hereinbefore set forth.

52,045.—Windlass.—George W. Holmes, Bridgewater, Mass.:

I claim my improved arrangement of the friction wheel, B, the brake, f, the crank, E, the tooth, g, and the ratchet, b, as described, the whole being applied to a case, or its equivalent, and to a windlass, A, and to operate substantially as specified.

I also claim the combination of the auxiliary pawl, e, and ratchet, d, with the windlass, A, the case, c, the crank, E, the brake, f, the tooth, g, and the ratchet, b, the whole being to operate substantially as described.

52,046.—Composition for Filling Wood.—Nils R. Holuquest, Sweden, now residing at Boston, Mass.:

I claim the said composition, made of the ingredients and in the manner and for the purpose substantially as described.

52,047.—Water Cooler.—E. E. Hopkins, Philadelphia, Pa.:

I claim a water cooler composed of an outer casing, A, an inner casing, c, a reservoir B, and a pipe, K, the latter being combined with the carriage, and forming an inverted syphon, as and for the purpose described.

52,048.—Gearing and Thrashing Machine.—L. B. Hubbell, Alton, Ill.:

First, I claim the placing of the shaft, E', in an adjustable frame, F, arranged and applied to the framing of the thrashing machine in such a manner that the bevel wheel, D, may be adjusted in a proper relative position with the wheel, B, to compensate for the wear of the bearings of the shaft, c E', of the thrashing cylinder, and the wheel, D, as set forth.

Second, I claim the set screws, L, and cylinder, M, arranged relatively with the bearing of the shaft E', to admit of the longitudinal adjustment of said shaft and the keeping of the wheels, B D, in gear with each other, substantially as described.

52,049.—Cultivator.—G. L. Hutchinson, White Rock, Ill.:

First, I claim the rock shaft, h', arms, h, and standards, b', in combination with the axletrees, B, and adjustable braces, b c, when arranged as and for the purpose set forth.

Second, I claim the arrangement of the lever, P, and adjustable tongue, D in combination with the frame, A, and axletrees, B, when hinged together, as and for the purpose described.

52,050.—Door Fastening.—F. A. and A. J. Illingworth, Weston, Mass:

We claim a portable door fastening composed of the slotted bar, A, and the adjustable claw, B, constructed and arranged substantially in the manner as and for the purpose herein set forth.

[This invention relates to a new and improved door fastening of that class designed for travelers, one that is extremely portable so that it may be carried in the pocket without any inconvenience whatever, and capable of being applied to a right or left hand door with the greatest facility.]

52,051.—Fence.—Albert Jackson, Clifton Springs, N. Y.:

I claim the panels, A, constructed of horizontal parallel bars, a, with rods or sticks, b, passing vertically through or otherwise attached to them in combination with the bars or slats, B, all being arranged as shown to admit of the ends of the bars or slats being fitted between the rods or sticks, b, substantially as set forth.

[This invention relates to a new and improved portable fence, or such as may be readily put up and taken down, and when put up be firmly secured in position, and any panel of the fence readily removed or made to serve as bars in order to admit of a team passing through.]

52,052.—Washing Machine.—H. P. Jones, Davenport, Iowa:

First, I claim the combination of the loose roller, a2, and its slotted bearings, d', with a pivoted washboard, substantially as described.

Second, The construction of the adjustable washboard, substantially in the manner represented and herein described, in combination with the vibrating presser, G, constructed substantially as

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described all applied and operating for the purpose and in the manner set forth.

Third. The segment groove, d, with radial branches, d d', for the purpose described.

52,053.—Cultivator.—Benjamin F. Kessler, Wilmington, Ill.:

I claim elevating and sustaining the beams, E, by means of the chains, m, drums, L, roller, K, wheel J, cord, b, and slide, m, when all arranged and operated substantially as described.

52,054.—Induction Coil.—Jerome Kidder, New York City:

First, I claim arranging the fine insulated wire which composes the helix or helices used upon a magnet for obtaining an inauced current or currents, either wholly or in greater quantity, at or near the center of the length of the magnet, or what is termed its neutral portion in combination with the arrangement of the inner or primary coil, S and its core of soft iron, G, substantially as and for the purpose specified.

Second, Making the said helix or helices adjustable upon the magnet between the poles and the so-called neutral portion thereof, for the purpose of varying the power of the induced current or currents, substantially as described.

52,055.—Lasting Pincers.—George Kump, Xenia, Ohio:

I claim the two pairs of jaws, A A, G G, in combination with the screw, D, toggles, B F, nut C, and plate, E, all arranged substantially in the manner as and for the purpose herein set forth.

[This invention relates to a new and improved pincers for drawing the boot or shoe over the last, so that it may fit simply thereto, which operation is technically termed "lasting."]

52,056.—Auger.—Ebenezer G. Lampson, Windsor, Vt.:

I claim constructing twisted augers having curved cutting edges with the base of the tug screw depressed into the twisted pod beyond the line of the cutting edges of the floor lips at their lowest line of cut, substantially as described.

52,057.—Artificial Legs.—Leomhard Legran, Allegheny City, Pa.:

I claim the arrangement of the suspenders, A A', and B B', straps, D and C, cords, d e and f, cross pieces, 1 and 2 hinge, S, screw, 5, nut 6, spring, m, rod o, gum, u, and hinge, r, when used in connection with the foot, c, and the parts, b and a, of the leg, the whole being constructed, arranged and operating substantially as herein described and for the purpose set forth.

52,058.—Harness Bells.—C. Theodore Liebold, New York City:

I claim the fixation of the bells shells opposite each other so that two form a globe cut in two, leaving a small space free between themselves securing thereby the richest tune and greatest beauty of form possible.

52,059.—Shipper Device.—Joseph F. Light, Worcester, Mass:

First, I claim the piece, B, cast with a socket in its lower end to receive the lever, and having a ball, b, at the other end, in combination with the pieces, G and F, for sustaining the same, substantially as set forth.

Second, The combination with the pieces, G and F, of the flange, C, for the purposes set forth.

Third, The combination with the slotted piece, B, of the slide sleeve, D, and slide rod, E, substantially as set forth.

52,060.—Horse Hay Fork.—Richard W. Liscomb, Smithfield, Pa.:

I claim the brace, F, applied to the arm or handle, B, and to the hoisting rope G, to operate in the manner substantially as and for the purpose herein set forth.

52,061.—Lime Kiln.—John L. Livingston, Mount Carroll, Ill.:

I claim a double passage or feed way, P P, from the one entrance, B, to the two furnaces, m m, substantially as and for the purpose specified and delineated.

Second, I claim the combination of the two sunken grates, a a, with the straight sided walls, R R, of the furnace, the whole so arranged, that one or more layers of wood will fall in the furnaces before full, and so that the wood comes in contact with the walls of the furnaces their whole length, and therefore heat equally, substantially as described.

Third, I also claim as a separative between the shaft and cooler of a lime kiln the cut-off slide, A, having a cog rack on its bottom, and a gage flange, k, on its top when employed in combination with the frame, z, shaft and pinion, S, and friction roller, or bearing, H, substantially as specified.

52,062.—Dough Kneader.—John C. Loveland, Springfield, Vt.

First, I claim the combination of the rollers, B and D, constructed as described with each other and with the frame, A, substantially as described and for the purpose set forth.

Second, The combination of the inclined aprons or tables, K, with the rollers B and D, and with the frame or support, A, substantially as and for the purpose set forth.

Third, The combination of the disk, M, with the roller, B, the aprons, K, and the supports, A, substantially as described and for the purpose set forth.

[This invention consists of a kneader in which the dough is passed from a slightly inclined table between a pair of rollers and passing out upon another inclined table in a thin sheet. This sheet is then folded and passed again between the rollers, the operation of kneading being performed by simply turning a crank.]

52,063.—Car Brake.—George F. Lynch, Milwaukee, Wis.:

I claim connecting the brakes of railroad cars with their own bumpers, respectively in such a manner that each car of a train of cars in motion, shall automatically apply its own brakes, by means of the force of its momentum operating upon and through its forward bumper for the time being whenever that bumber is brought in contact and impact with a bumper or other part or appendage of the preceding car tender or locomotive, substantially as herein described employing for that purpose the aforesaid means of connection between the brakes and bumpers.

52,064.—Cavalry Accouterments.—J. K. Mizner, Detroit, Mich.:

First, I claim the arrangement of the haversack, P, the cartridge boxes, D, the belt, A, and forked strap, G G G, substantially as described.

Second, I claim the divisional haversack, consisting of an upper portion occupied by boxes and a lower sack-like portion appended thereto, arranged and inclosed substantially in the manner and for the purpose described.

Third, I claim the strap, N, as applied to the cartridge boxes in the manner and for the purpose described.

52,065.—Pipe Tongs.—Joel Moulton, Boston, Mass.:

I claim the construction of the tongs or wrench with a fixed jaw and shank e, sliding shank, f, and lever, i, having a griping face and operating, substantially as set forth.

52,066.—Churn.—James O'Donald, Clinton, Ill.:

I claim the construction of the dasher, with two or more slats attached thereto, and standing at an angle with the dasher shaft so as in their revolution to whirl the cream inwardly or outwardly, according to the direction in which they are rotated, substantially as described.

52,067.—Insect Trap.—William Ogden, Philadelphia, Pa.:

First, I claim the combination substantially as described of a antern of any desired form with a reservoir, C, for the purpose specified.

Second, In combination with the above I claim the inclined plates, D, of glass, for the purpose set forth.

52,068.—Expanding Tap.—G. Adam Ohl, Newark, N. J.:

I claim the peculiar form of shank and the arrangement of moving the cutters, C, by means of the internal screw, E, and nut, N, or by any similar device.

I also claim the combination of the several parts described in specifications and annexed drawings.

52,069.—Portable Soda Fountain.—Augustus J. Ohmer, Hamilton, Ohio:

I claim combining with a portable refreshment fountain the refrigerator, B, traversed by the the discharge pipe, C, in the manner substantially as set forth.

52,070.—Pump.—A. N. Parkhurst, Peoria, Ill.:

First, I claim securing glass, porcelain, or vitrified valve chambers in wooden pumps by wooden rings or washers, arranged and operating substantially in the manner described.

Second, In combination with the foregoing forming and securing the connections of wooden pipes for pumps with stay rods of metal, arranged and operating substantially in the manner described.

52,071.—Grain Separator.—E. C. Patterson, Chicago, Ill.:

First, I claim the construction and arrangement of the saw-toothed agitator, J, in the manner and for the purpose described.

Second, The hinged apron, H, in combination with the shoe, E, and grain riddle, g, substantially as described.

Third, The construction and arrangement of the eccentric shaft, G, so that it give motion directly to the screen, F, and also vibrates the shoe, E, substantially in the manner described.

Fourth, The shaft, G, which is eccentric from one end to the other, in combination with the narrow strip, d, which is adjustable longitudinally on the shaft, substantially as described.

Fifth, The construction of the fan case with the parts, B C' C2 n a, and applying it in respect to the upper and lower ends of the sieves substantially in the manner and for the purpose described.

Sixth, The adjustable tail piece, c2, in combination with the fan case, B, and trunk, c, substantially as described.

52,072.—Method of Preserving Eggs.—Nancy Patton, Coles, Ill.:

I claim the combination of the said chemicals in water, so that the liquid will harden and close the pores of the shell of the egg, toughens the membranes next to the shell and that inclosing the yolk, without destroying any of the essential qualities of the egg, but rather improving its flavor and quality.

52,073.—Mechanism for Setting Type in Making Stereotype Plates.—John Paulding, New York City:

First, I claim a revolving type holder as hereinbefore described for the purpose of readjusting the type as set forth.

Second, I also claim, in combination with the type holder, a series of rows of adjustable type, having a guide spring rod attached thereto, and arranged with respect to each other substantially as described.

Third, I also claim the method of adjusting the type in the type holder by means of one or more stops or catches, n and K, on the edge of the guide spring rod attached thereto, substantially as described.

Fourth, I also claim the sliding type setter, H, in combination with the type holder, c, when operating in the manner and for the purpose hereinbefore set forth.

Fifth, I also claim a gage notch, J, formed in the body of the type, in combination with a straight edge slide, F, when operating for the purpose and in the manner substantially as hereinbefore described.

Sixth, I also claim the general combination of all the said several parts of the said machine, as enumerated in the five preceding claims, as a means of impressing the forms of type in a plastic mold for making stereotype plates, by the single line or part of a line, from a perpetual face of type substantially as hereinbefore set forth.

52,074.—Trunk.—Isaac L. Plumer, Chelsea, Mass.:

I claim attaching the tray, C, to the upper portion of the trunk by means of slots and pins, substantially as described.

52,075.—Churn.—John Rankin, New York City:

I claim the use of a case or box, A, of a nearly cylindrical form, substantially as described in connection with the two screw dashers, the whole arranged to operate in the manner and for the purposes set forth.

I also claim introducing a blast of air in a sheet through a long slot in the side of the box, A, and by means of a blower, substantially as described.

I also claim the use of the internal gear, S, friction-face wheel, l, gears, R and T, and friction pulley, q, the whole combined and arranged to operate as and for the purpose set forth.

I also claim the employment of a double set of vanes, m m2, the shaft, p, of the blower, whereby a tendency is created in the blast to concentrate somewhat towards the center of the slot, O, substantially as and for the purpose set forth.

I also claim making the slot, O, inclined or oblique, in cross section, so as to tend to conduct the sheet of blast downward in the mass of cream.

52,076.—Uterine Supporter.—Frederick Reichenback, Rochester, N. Y.:

I claim the combination of the expanding device consisting essentially of the ring, A, hinged wings, D D, and the sliding stem and tube, B C, with the elastic covering pessary, E, the whole operating substantially in the manner and for the purpose herein set forth.

I also claim the special construction of the expanding device, the same consisting of the ring, A, hinged expanding wings, D D, operated by wires, d f, the clamping nut and disk, c b, and the sliding stem, B, tube, C, and nut, K, the whole arranged and operating substantially as described.

52,077.—Heel Cork.—J. F. Richardson and George F. Morse, Portland, Me.:

We claim the strip of metal bent as described and combining the tongue, C, the springs, A, and the pivots, c, as and for the purposes specified.

52,078.—Steam Engine.—Thomas C. Robinson, Boston, Mass.:

I claim the arrangement in connection with a steam engine of an exhaust cylinder, the same as the motive cylinder substantially, and connected with the motive cylinder by two pipes and their valves, one at either end, and operated by a piston connected with the piston or the motive cylinder by a rigid arm, and also connected with a water tank by two pipes with their valves, one at each end of the cylinder, the whole constructed and operated substantially as described.

52,079.—Hoe.—Seymour Rogers, Pittsburgh, Pa.:

I claim a hoe formed by combining an eye slotted and constructed as described with the perforated blade, substantially as described and for the purpose as set forth.

[This invention consists in making the blade and eye of the hoe detachable, the blade having a hole through it to receive the eye, and the eye having a groove around its lower end to receive the edge of the blade, and being slotted vertically to allow it to be sprung into its place. The attachment of the handle binds the blade and eye firmly together.]

52,080.—Portable Fence.—Charles Rowland, Clinton, Ill.:

I claim the stakes, C C, secured to the top boards or slats, A, of the panels by pins, D, and connected by pins or rods, E, in combination with the stakes, F, and oblique pins, G, all arranged and combined with the panels to form a new and improved portable fence, as herein shown and described.

[The object of this invention is to obtain a portable fence which will be simple in construction, capable of being readily put up and taken down, and secured firmly in position when put up, and which will accommodate itself to uneven ground.]

52,081.—Horse Shoe Nail Machine.—G. W. Sargent and B. P. Rider, Chelsea, Mass.:

We claim the combination of four loose hammers running in grooves moved by levers working in mortises in said hammers, said levers working on loose pins and vibrated by a cam, so formed as to give to each hammer two distinct blows to each revolution of said cam.

52,082.—Tide Wheel.—William H. Sears, Cheshire, Conn.:

I claim as new and useful the combination of buckets, D D' E E', more or less in number and constructed and arranged to operate in the manner and for the purpose specified.

52,083.—Hand Cultivator.—George Smith, Omaha City, N. T.:

First, I claim, in combination with a frame, A, mounted on one or more wheels, C, and arranged so as to be shoved along by the operator, a clamp for holding the plow or hoe composed of the nuts, F, the bar, E, placed on screw rods, D D, and having a parallel position with the front bar, b, of said frame, A, substantially as shown and described.

Second, The strap, B, applied to the handles, a a, of the frame, A, substantially as and for the purpose specified.

Third. The hoe, G, constructed in V-form, in combination with the upright lips or projections, d, at its rear ends, substantially as and for the purpose specified.

[This invention relates to a new and improved plow or cultivator designed to be shoved along by the operator, and to supersede the use of the ordinary hoe and other hand implements now employed for cultivating those crops which are grown in drills or hills.]

52,084.—Hay and Cotton Press.—J. Nottingham Smith, Jersey City, N. J.:

First, I claim an annular wedge or wedges, receiving the motive power direct, and operating as the driving force for applying pressure, or for analogous purposes, substantially as herein specified.

I also claim two or more annular driving wedges, alternating in action, so as to produce a continuous effect, substantially as and for the purposes herein set forth.

I also claim the shifting or reversing gear, between the driving wheel and annular wedge rim, whereby a change is effected from increased speed to increased power and vice versa, while the motion of the power remains constant, substantially as herein specified.

I also claim the alternating lifting posts, or reciprocating racks, for communicating the pressure or force of the annular wedges continuously to the follower of a press, or other part to be driven, substantially as herein specified.

I also claim the tripping plates, T T, arranged and operating substantially as herein described, in combination with the lifting posts, or reciprocating racks, for the purpose of reversing the motion of the follower or its equivalent, as set forth.

I also claim the combination and arrangement of the bent levers, 3 3, and adjustable blocks Y Y, operating in connection with the tripping plates, substantially as and for the purpose herein described.

I also claim the construction and arrangement of the counter weighted pawls, Z Z, substantially as and for the purpose herein specified.

I also claim the hinged or pivoted lifting arms, J J, arranged and operating substantially as and for the purposes specified.

I also claim the construction, arrangement and combination of the side doors, B B, of the press with their brackets, cleats, lifting arms, ways and cords, and a windlass, or its equivalent, whereby the doors are drawn away and returned to and secured in place automatically, all operating substantially as and for the purposes herein set forth.

I also claim the pivoted, vibratory bar plate, F, on the swinging edge of the top door of the press, arranged and operating substantially as herein set forth.

I also claim the combined arrangement of the bar plate, F, the opposite pivot edge of the top door, the girts projecting over them, and the cords and windlass or their equivalent, by which the door is raised and lowered, all substantially as herein described.

52,085.—Washing Machine.—Stephen Spelman, Westfield, Mass.:

I claim the combination of the standards, B B, beam, C, arms, E, socket, K, washboard, M, with its braces, L, and the lever, R, arranged as described and for the purposes set forth in this specification.

52,086.—Copying Press.—Irah D. Spaulding and David N. B. Coffin, Jr., Boston, Mass.:

We claim the adjustible cam, f, in combination with the rolling beam, g, constructed and applied substantially as and for the purposes set forth

52,087.—Apparatus for Carbureting Air.—James F. Spence, Brooklyn, N. Y.:

First, I claim the wheel, B, when constructed as specified, and employed in combination with the drum, A, and pipes, d d', to catch and continue the air and force it under the surface of the liquid, in the manner explained.

Second, The goose neck, arranged in combination with the gas pipe, F, drum, A, and air supply pipe, d or d', in the manner and for the purpose substantially as herein specified.

[The object of this invention is an apparatus whereby a quantity of atmospheric air is passed over the surface of a quantity of benzine or other hydrocarbon liquid, and by taking up the vapors emanating from the hydrocarbon liquid said air is converted into illuminating gas.]

52,088.—Breast Collar.—Samuel E. Stowell, Charlestown, Mass.:

I claim, in combination with a breast strap of a double driving harness, the metal spreader, applied and operating in the manner and for the purpose substantially as set forth.

52,089.—Wheel for Railroad Car.—A. W. Straub, Philadelphia, Pa.:

I claim a car wheel consisting of rim or tire, A, and the web or center, B, constructed and combined together substantially as and for the purpose described.

52,090.—Apparatus for Desulphurizing Ores.—Augustus H. Tait and Joseph W. Avis, New York City:

We claim the process herein described of desulphurizing sulphurets by a current of heated, compressed atmospheric air impelled by a suitable pump, in combination with a closed furnace containing the ore, substantially as set forth.

Also, the use in this process of nitric oxide gas, in combination with the atmospheric air, as set forth.

Also, the use of steam in combination with the heated air, as and for the purpose described.

52,091.—Medicine Compound.—Aaron S. Talbert, Lexington, Ky.:

I claim the medicine compound or Crab Orchard Salts, as herein described, the same constituting a new and useful manufacture.

52,092.—Corn Sheller for Table Use.—E. Lawrence Tevis, Philadelphia, Pa.:

I claim the teethed blade, D, in combination with branches, K, K', and handle, H, using for that purpose any suitable metal or hard wood, or both combined, when constructed and operating as herein set forth and described.

52,093.—Cultivator.—J. H. Thomas and P. P. Mast, Springfield, Ohio:

First, We claim pivoting and bracing the shield bars, C, to the beams, B in such a manner that the shields will retain their relative position to the shovels when they are being moved laterally and at the same time be permitted to play up and down independent of each other, and of the shovels, as and for the purpose set forth.

Second, We claim the metal pieces, O, constructed as shown, and arranged to operate in connection with the bars, C, as herein set forth.

Third, We claim the metal stirrups, O, constructed as shown, and arranged to operate in connection with the swinging bar, b, and beam, B, as set forth.

Fourth, We claim the pulleys, e, secured to the standards, E, in combination with the rock shaft, I, chains, S, and beams, B, arranged as shown and described.

Fifth, We claim the angle irons, L, constructed as shown, and arranged to operate in connection with the axle, G, standards, E, and rock shaft, I, as and for the purpose herein set forth.

52,094.—Mode of Manufacturing Articles of Woven Wire.—John A. Topliff and Thomas Tunnington, Elyria, Ohio:

We claim the application to woven, twisted, or other wire work or netting so called, of any of the ordinary galvanizing processes, substantially as and for the objects specified.

[This invention consists in subjecting to any of the well-known and generally practiced galvanizing processes any and all articles which are now, or may be hereafter, manufactured of wire netting, whether having large or small meshes and of whatever size of wire, the object being to thus cause the various wires, at that crossing, and interlocking points with each other, to be firmly united or soldered together, as it were, whereby great strength, rigidity and stiffness is given to the wire netting, increasing its value and use fulness in a large degree.]

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52,095.—Pegging Jack.—Albion K. Washburn, Bridgewater, Mass.:

I claim the improved arrangement of the actuator, H, relatively to the heel and toe supporters, such actuator under such arrangement being caused to pass through the toe supporter and operate against the front part of the heel supporter, substantially as hereinbefore explained.

52,096.—Lifting Jack.—A. F. Wagner, Ilion, N. Y.:

I claim the brackets, F, projecting from the standard, A, in combination with the toothed bar, D, the lever, G, connected by links, H, to the upper part of said brackets, and the detaining pawl, E, pivoted at the lower ends of said brackets, in position to be readily retracted by the foot, all as herein described.

52,097.—Car Coupling.—Hazen Webster, Elgin, Ill.:

First, I claim the catch or hook, g, when placed at, and firmly attached to, the side of the draw bar of a bumper, substantially as and for the purposes set forth.

Second, I claim the hook, B, provided with a catch, f, and placed on the side of a bumper or draw bar, A, having a fixed catch, g, on its opposite side, and arranged to operate in connection with another one similarly constructed.

Third, I claim the arrangement and combination of the hooks, B, catches, f and g, so that when two are placed together each will act independently of the other in operation and each spring hook attach itself to a separate fixed catch.

Fourth, I claim placing the hooks of an automatic coupling on the side of the draw bar, so that they will pass the fixed catches and allow the draw bars to act as bumpers, without interference from, or injury to, the hooks, and without releasing the coupling. All of the several parts and combinations being substantially as and for the purposes set forth and specified.

52,098.—Horse Rake.—A. Wells, Morgantown, W. Va.:

I claim the lever, C, applied to the rake head, A, as shown and provided with the spring pawl or catch, E, for the lips, b, b, on the rake head to bear against; in combination with the slide, F fitted to the lever, C, and provided with the cross head, G, to lap over the projecting edges, a' a', of the two teeth of the rake head, substantially as and for the purpose herein set forth.

52,099.—Railroad Frog.—William Wharton, Jr., Philadelphia, Pa.:

I claim the mode, substantially as herein set forth, of securing steel plates to a railroad frog, so that they can be elongated without their firm hold of the frog being affected.

52,100.—Ship Building.—Norman W. Wheeler, Brooklyn, N. Y.:

First, I claim constructing navigable vessels, with one or more decks, c c d d, sheered in a way opposite to the sheer of the rail b b, substantially as and for the purpose described.

Second, I claim the quadrant deck, d d, in combination with the recesses, e e, substantially as and for the purposes described.

52,101.—Triangular Beam Engine.—Norman W. Wheeler, Brooklyn, N. Y.:

I claim connecting the working pistons with the crank by means of the triangular beam, o o, links, j j, and the parallel motion, g g, k k k k l, or their equivalents, substantially as and for the purposes described.

52,102.—Well-boring Apparatus.—George L. Witsel, Philadelphia, Pa. Antedated January 3, 1866:

First, I claim providing for giving a rotary and vertical motion to a shaft, D, which is adapted for receiving on its lower end the tubular sections, E, and also for removing said shaft and the contrivances for operating it, from frame, A, when desired to elevate the well tube, substantially as described.

Second, I claim the combination of a windlass, J, rope or chain, J', and pulley, g, or their equivalents, with the frame, A, removable supporting beams, B C, substantially as described.

Third, I claim the shaft, D, provided with a screw, D', bevel wheel, a, and removable half nuts, e e, said parts being sustained upon the cross beams B c, of a frame, A, and operating substantially as described.

Fourth, I claim constructing a rock drill with cutting points varying in length, and so arranged that sharp cutters are successively brought into action, as the longest points are worn out, substantially as described.

Fifth, I claim a center discharging drill provided with cutting points, m n p, and a center point, J, of different lengths, substantially as described.

52,103.—Churn.—George Wolf, Williamsport, Md.:

First, I claim the above-described box churn, divided into several compartments and provided with the separate beaters, B, worked by either the lever or the crank, substantially as set forth.

Second, I claim the combination of the lever, F, and crank, G, whether worked alternately or together, substantially as described.

52,104.—Sulky Plow.—Thomas Wolfe, Girard, Ill.:

First, I claim the connecting of the front ends of the plow beams, G G, by hinges, H, to springs, I, attached to the framing of the device, in combination with the shafts, O, arms, d, rods, N, and levers, P, or an equivalent means for operating the springs, substantially as and for the purpose herein set forth.

Second, The raising and lowering of the plow beams through the medium of the rods, K K'', cranks, K' K'', shafts, L L', and levers, M M, all arranged substantially as described.

Third, The adjustable frame, S, constructed and applied to the plow beams, G G, substantially as and for the purpose specified.

[This invention relates to a new and improved plow, of that class which are connected to a mounted frame supporting a driver's seat, and are commonly termed sulky plows.]

52,105.—Cartridge Retractor for Revolving Fire-arms.—S. W. Wood, Cornwall, N. Y.:

I claim a lever for removing metallic cartridges or empty cases from the chambers of cylinder in revolving fire arms, pivoted further forward than the bottoms of the chambers, or in such a manner as to act directly by lever power upon the cartridges or cartridge cases, substantially as herein set forth.

52,106.—Wrench and Drill.—Nathaniel W. Woodbury, South Danvers, Mass.:

I claim the combination of the handle, A K, reversible revolving ratchet head, B, and spring pawl, C, when so arranged as to form a wrench for the manipulation of a set screw or for the insertion of the drill socket, O, or other bushings for analogous purposes.

[The object of this invention is to produce an implement which shall combine in itself a set screw wrench and a ratchet drill. The tool is, among other uses, especially applicable to turning set screws in places difficult of access, where other wrenches will not operate, and for boring holes in wood and iron in angular directions, and in places not easy of access with other tools.]

52,107.—Vulcanizing Flask.—A. B. Woodard, Alfred Center, N. Y.:

First, I claim closing the flask by the pressure of steam itself, substantially as herein described, so that while the rubber is gradually heated, the flasks are automatically compressed, and all danger of crushing the plaster mold and the teeth is avoided.

Second, The loose flange, g, and packing ring, i, in combination with the boiler, clamp, and flask, constructed and operating substantially as and for the purpose set forth.

Third, the inclined planes, j, on the inner surface of the boiler, in combination with the clamp and flask, constructed and operating substantially as and for the purpose described.

Fourth, The segmental connections, c, of the clamp, in combination with the flat surfaces on the flask and with the boiler, substantially as and for the purpose set forth.

52,108.—Washing Machine.—Joseph Adams (assignor to himself and Nathaniel Dearborn), Janesville, Wis.:

I claim the two pendant hinged frames, H H, attached to bar, G, and connected by springs, I, to operate in combination with the double concave bed, B, substantially as and for the purposes specified.

52,109.—Fan.—Gustav Anton (assignor to himself, Jacob Hirne, and Fren's Bruviere), Philadelphia, Pa.:

I claim a fan having a body composed of feathers secured to a handle of wood or other suitable material, in the manner described.

52,110.—Shoe.—John C. Bailey (assignor to Charles Eugene Woodman), Boston, Mass.:

I claim the shoe upper made not only with the fly, i, to lap over the quarters, and provided with the slits, g h, arranged in it as described, but having one or more straps, e f, extending from one or both the quarters, so as to be capable of being passed through the slits of the fly, as specified.

52,111.—Automatic Feed Apparatus for Steam Generators.—John B. Collen (assignor to himself and John McGill), Philadelphia, Pa.:

I claim the reservoir, A, its supply pipe, W, the valves, c c, and float, G, the whole being constructed and operating and applied to a steam boiler, substantially as and for the purpose specified.

Second, The combination with the cap, B, the spindle and its valves of the plate, D, tube, C, and rods, a a, or their equivalents, substantially as and for the purpose described.

Third, The combination of the weighted lever, I, and screw spindle, E, with the sleeve, C, and float sleeve, c,' substantially as described for the purpose set forth.

51,112.—Buckle.—Samuel P. Crafts (assignor to O. B. North & Co.), New Haven, Conn.:

I claim the combination of the lever, B, with two tongues, H I, when constructed and arranged to operate in the manner substantially as and for the purpose specified.

52,113.—Feed Apparatus for Steam Generators.—Charles Henry Ford (assignor to himself, Hayward, Hutchinson, Jesse L. Hutchinson and Elias. S. Hutchinson), Baltimore, Md.:

I claim the arrangement with the vessel, A, of the valved water pipe, E, and the steam pipes, D C, proceeding from and to the boiler and provided with suitable valves, the whole substantially as described and represented and for the purpose set forth.

52,114.—Steam Damper Regulator and Indicator.—Charles Henry Ford (assignor to himself, Hayward Hutchinson, Jesse L. Hutchinson, and Elias T. Hutchinson), Baltimore, Md.:

First, I claim the arrangement of the adjustable post, K, weighted lever, F, piston, B, and the packing arrangement c b, substantially as described.

Second, I claim in combination with the piston, B, and lever, F, the rod or chain, I, and rock shaft, R, actuating the dampler, H, and furnace door, X, one or both, substantially as described.

52,115.—Automatic Steam Generator.—Charles Henry Ford (assignor to himself, Hayward Hutchinson, Jesse L. Hutchinson and Elias S. Hutchinson), Baltimore, Md.:

First, I claim a suspended boiler so arranged relatively to the fire and counterpoise weights that, by evaporation and loss of water or by the influx of feed water, it shall rise or fall respectively, and by said motion actuate devices to open or close the apertures which regulate the supply of water, substantially as herein set forth.

Second, I claim in combination with a steam boiler, which is vertically adjustable as described, the devices which operate to open and close the dampers, furnace doors whereby control the draft or supply of air to the furnace, substantially as herein set forth.

52,116.—Cotton Seed Machine.—F. A. E. G. de Massas, Hoxton, Eng.:

First, I claim a revolving cylinder with a rough surface, as described, in combination with a cylindrical casing composed partly of cords and partly perforated sheet metal as specified, the two acting in combination, substantially as set forth.

Second, In combination with a revolving cylinder and a cylindrical casing, both substantially as set forth, I claim a fan and a spout, the whole combination acting subsantially in the manner and for the purpose set forth.

52,117.—Locomotive Engine.—Robert Francis Fairlie, London, Eng.:

First, I claim the arrangement of the fire box and the two boilers extending from opposite sides thereof with the two bogie frames, as set forth.

Second, I claim the arrangement of two trucks, each provided with four or more wheels and with one or more steam cylinders, in combination with a steam boiler, B B, constructed and operating substantially as and for the purpose set forth.

[The object of this invention is to obtain a large amount of tractive power, and at the same time, to avoid any excessive pressure of the driving wheels of a locomotive, also to provide for the locomotive adapting itself readily to the turning of sharp curves without the disadvantages usually attending the action of large locomotives under like circumstances.]

52,118.—Brush for Cleaning Horses.—John Haworth, Manchester, Eng.:

I claim grooming and cleaning horses and other quadrupeds by means of a brush attached to a pole or shaft, having loose handles and a suitable shaped pulley, through which pulley a rotary motion is imparted to the said brush by connecting it with any suitable driving power, substantially as described.

[This invention relates to brushing and cleaning horses and other quadrupeds, by means of a rotating brush or other suitable instrument to which rapid motion is given by steam or other power. The brush or other instrument thus used is fixed to the end of a pole furnished with loose handles, and with a roller or pulley, is passed the band or strap to the shaft for driving the same. The brush is capable of being moved up and down, and from one side to another, and when used is to be guided by the attendant over the surface of the animal to be brushed and cleaned, thereby economizing manual labor and performing the operation expeditiously and effectually, and removing the dandruff or other impurities of the skin without the use of the curry-comb.]

52,119.—Sash Supporter.—Francis P. Catlin, Hudson, Mich.:

I claim as a new article of manufacture, the sash supporter and fastener, constructed and operated as herein specified.

REISSUES.

2,146.—Auger.—Russell Jennings, Deep River, Conn. Patented Sept. 30, 1855. Reissued Oct. 3, 1865:

I claim the projecting of the floor lips in advance of the cutting spur, substantially as herein described and for the purpose herein set forth.

2,147.—Ornamental Chain.—Sackett, Davis & Co., Providence, R. I., assignee of James Lancelott. Patented March 22, 1859:

I claim, First, A sheet-metal chain composed of links the base of each of which is a polygon of six or more sides, the chain being formed by bending each arm longitudinally, at the same angle, or nearly so, with one of the outer angles of the base, so that a cross bar on the extremity of each arm of the next preceding link in the chain shall, when bent down, bear against the angular side of two of the arms of the next succeeding link, and thereby enable the chain to withstand a strain nearly equal to the cohesive strength of the metal, the article being substantially as specified.

Second, A sheet-metal chain the arms of whose links are bent together as described, for the purpose of increasing the strength of the chain and giving to it the appearance of being made from wire instead of from sheet metal.

2,148.—Horse Rake.—Ariel B. Sprout, Hughesville, Pa. Patented June 6, 1865:

I claim the use of a foot lever for holding up the rake head of a horse rake which has the point or center of vibration of the teeth arranged in rear of said rake head, as herein described and for the purpose set forth.

Second, The combination of the foot lever, E, with the roller, K, said lever being so arranged that it moves back with the depression of the rake head and forward with the elevation of said rake head, and travels upon said roller, being rigidly fixed to the machine, as herein described and set forth.

Third, I claim attaching the fulcrum bar, F, to the cleaners or other rigid parts of the rake by means of straps, g, connecting the two parts to a hinge joint so as to allow a limited amount of vertical play to the bar, F, for the purpose herein described and set forth.

Fourth, I claim in combination with the strap, g, the movable rings or their equivalents, for the purpose of preventing the vertical play of the bar, F, relatively to the cleaners, under the circumstances described.

Fifth, I claim the extension in front of the axle of the cleaners, G, which support the rake head so as by their vertical adjustment to regulate the hight of the rake head from the ground at a given elevation to the shafts.

Sixth, I claim the rotating notched pintled bolts, h h', with grooves therein corresponding to similar grooves on the lug, H', for coiling the spring formed on the end of the tooth until said tooth has acquired the requisite force for holding it in the desired position, said spring being held in its coiled position by the action of the nut on the bolt, as herein described and set forth.

DESIGNS.

2,241 and 2,242.—Plate of a Stove.—Lewis Rathbone, Albany, N. Y. (Two claims.)

2,243.—Trade Mark for Pens and Pen Boxes.—John B. Waring, New York City.

Notes and Queries

J. O. sends us a plan of a pump which is intended to elevate a column of water without the application of any force, and asks:—"Is there anything in the nature of things to prevent this arrangement for the elevation of water to an unlimited hight? Please oblige with an unequivocal answer." ANS.—We unequivocally reply that there is nothing in the nature of things to prevent your contrivance from operating except its lack of motive power. Like all perpetual motionists, you will doubtless aver that you do apply power. Yes, in the same manner, and with the same effect that one lifts himself by getting within a tub and tugging at the handles.

J. A. W., of N. B.—By the rotation of the earth, bodies at the equator are carried from west to east with a velocity of about seventeen miles per minute, while near the poles they move more slowly. When a river runs northward the water is constantly reaching ground that is moving eastward less rapidly than itself, and consequently it tends to run upon the eastern bank. If the ice in the St. John pushes up the western bank it moves in opposition to the general law—probably from the formation of the bottom or the course of the winds. An old file does not cut better for being rubbed with charcoal.

F. J., of Mass.—The best way to learn to be an engineer is to begin at the foot and obtain a situation as fireman on some railroad, if possible, or in some factory. We are frequently requested to name the books in which a man who is a good mechanic can learn to run an engine. The only road we know is the road of experience, and that is often a hard one to travel. It is distasteful to many to handle a shovel, but if a man wishes to be "master of the situation," as an engineer should, he must know how to fire as well as how to handle a starting bar.

A. D., of N. Y.—Saw dust is bad stuff to throw down between the weather boards of a building. It absorbs moisture and soon rots, or at least sweats, making a very bad smell, besides injuring the building.

J. F.—Drilling supports combined with lathes are not new; but if you have invented any new combination or construction thereof, a patent may be obtained.

H. F. H., of Mich.—The cotton manufacturers of New England generally run their water wheels with a velocity, at the circumference, of about six feet per second. The best overshot wheels yield about 70 per cent of the whole power of the water, the best turbines about 90 per cent. With overshot wheels there is great loss of power from back water, but not with turbines. Ure's Dictionary of Arts and Sciences contains quite a treatise on water wheels.

T. L. W., of Ga.—At the great trial in Philadelphia the turbine of J. E. Stevenson, No. 200 Broadway, New York, yielded 88 per cent of the whole power of the water, besides the friction, which was estimated at 3 per cent more. Breast wheels have long been preferred to overshots, but they are now being superseded by turbines. There is no gain by increased leverage—what is gained in power is lost in speed.

Projectile, of Mass.—We have no doubt of the correctness of the answer. The resistance of the air to a projectile during its ascent prevents it from rising so high as it would in a vacuum, and, as it does not rise so high, it would not acquire the same velocity during its descent, even if it fell through a vacuum; but it falls through the atmosphere the resistance of the air still further diminishes its velocity.

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J. M., of N. Y.—You should apply to the internal revenue collector of your district to learn the amount of your taxes and who is to pay them.

A. R. S., of Ohio.—Red lead and boiled oil is the cheapest paint we know of for iron work. The quickness with which it dries varies with the amount of "drier" you put in.

J. W. D., of N. J.—Smee's Electro-plating is generally acknowledged as the best hand-book on the subject. The latest discoveries in that line are published in the SCIENTIFIC AMERICAN so soon as they become public property.

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Improved Horse Rake.

This engraving represents a new improvement in horse rakes, by which it is claimed they are rendered more perfect in operation, and less liable to raise when not desired.

In order to control the action the inventor provides a lever, A, jointed to the frame at one end, and having a short arm, B, working on it. This latter connects with a vertical arm, C, on the rake shaft, as will be seen by the engraving.

It will further be observed that in the position there shown the rake teeth are held firmly to their work, preventing them from raising partially, and scattering loose uneven winrows. At the same time the teeth are free to conform to undulating ground by the springing of the teeth.

Fig. 2 shows the invention enlarged. This combination forms a toggle joint, and acts equally well to prevent the rake from falling when the lever is thrown forward so as to raise it clear of the ground, as it does when going from one field to another.

This rake is easily operated by any boy old enough to drive, and the lever can be applied to a machine of any style. It may be reversed, if desired, so as to operate from the front instead of the rear of the driver.

In unloading, the lever is brought forward to about an angle of 45° with the shafts, and no further, and can be returned to a rest or lock without letting go of the lever.

It was patented by O. J. Hardgrove, on March 22d, 1864. For further information or shop rights address O. J. Hardgrove & Co., Canton, Ohio.

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Fig. 1.

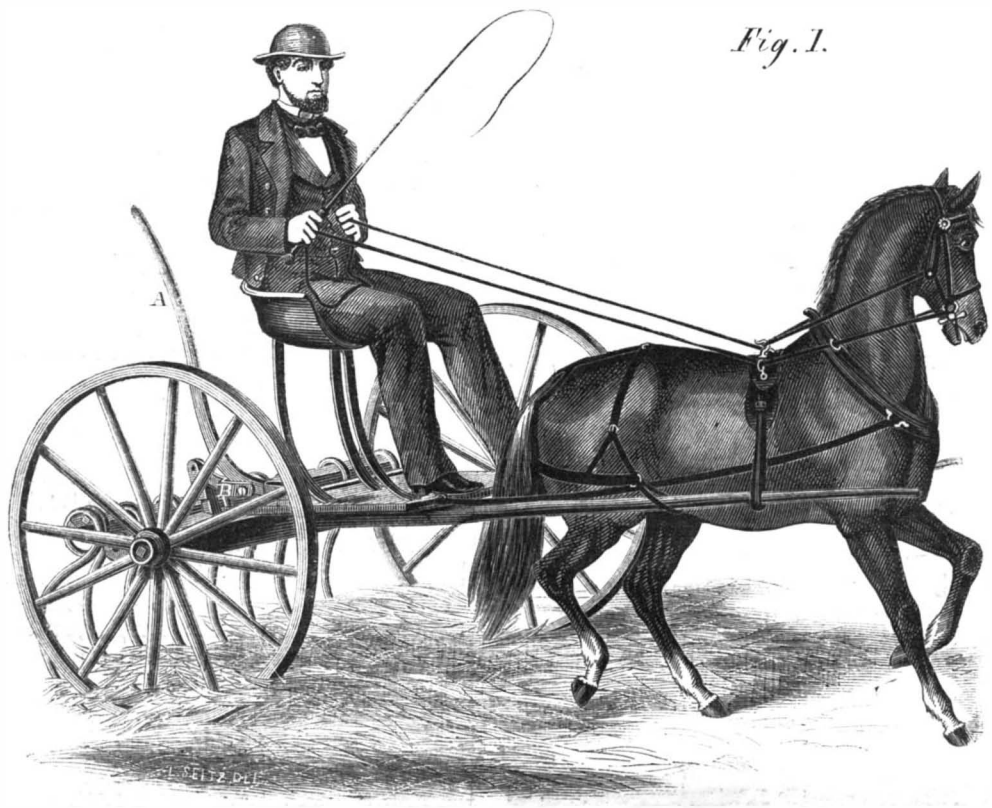
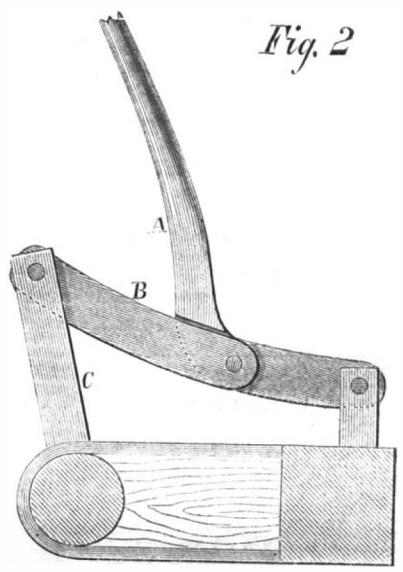


Fig. 2



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Make a substantial model, not over one foot in size. When finished, put your name upon it, then pack it carefully in a box, upon which mark our address; prepay charges, and forward it by express. Send full description of your invention, either in box with model, or by mail; and at the same time forward $16, first patent fee and stamp taxes. As soon as practicable after the model and funds reach us, we proceed to prepare the drawings, petition, oath and specification, and forward the latter for signature and oath.

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J. HOLT.

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